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I - INTRODUCTION

This chapter introduces the scope and nature of the market dominance research program A. T. Kearney, Inc. is conducting under the direction of the Commission staff. The results of the research are presented in the following eight chapters:

Chapter II - Market Dominance and Rail Regulatory Reform presents the relationship of market dominance to issues of rail regulatory reform.

Chapter III - Theoretical Basis for Study of Market Dominance discusses the background against which the study has been undertaken.

Chapter IV - Research Design covers the basic technical strategy for the project and details the research design employed. Included are descriptions of the data base enhancements and empirical analyses.

Chapter V - Results of Empirical Analysis presents a summary of the statistics developed in the empirical analyses. This supports the detailed appendices containing computer generated results.

Chapter VI - Assessment of Railroad Market Position for Selected Commodities examines the results of Kearney's research into the rail market position in physical distribution and logistic systems of selected key industries.

Chapter VII - Interpretation of Empirical Analysis discusses the implications of the results of the research. The procedural alternatives are based on these conditions.

Chapter VIII - Procedural Issues and Alternatives For Implementing Market Dominance Provisions covers the practical procedural factors which must be considered to develop alternatives. The chapter also presents an evaluation framework, applies it to selected alternatives, considers specific case studies, and summarizes and interprets the results.

Chapter IX - Summary and Recommendations presents the conclusions and recommendations derived from the study.

This is the second Interim Report developed under this research contract. The first report focused on the development of an analytical framework for the research; the derivation of alternative concepts for analyzing market dominance; specification of preliminary procedural alternatives: and definition of empirical analysis. This report presents the results of the empirical research on alternative measures of market dominance, relates the empirical research to the procedural analysis and regulatory concepts previously developed, and presents an analysis of selected alternatives for implementation of the Commission's rail rate responsibilities under the 4-R Act.

OBJECTIVES OF THE STUDY

The primary objective of this study is to assist the Commission in refining its approach to market dominance and to provide research results to support the Commission's deliberations and decisions in implementing Section 202 of the 4-R Act. This includes developing and examining a number of concepts and alternatives for implementing the concept of market dominance contained in Section 202(b). This concept revised the traditional framework of rail rate regulation by distinguishing between competitive and noncompetitive traffic and limiting the Commission's maximum rate authority only to cases where market forces were inadequate to protect the public interest.

Since the passage of the 4-R Act the Commission has taken a number of actions to place greater emphasis on competitive forces to regulate the rail industry. However, the lack of experience and the uncertainty of the shipper and carrier responses have made the realization of the Act's goals a slow process. The case-by-case implementation of the 4-R Act has been costly and uncertain for all the parties involved. Given this background, the main objective of this study is to:

- Analyze the concept of market dominance and recent experience with current procedures, and
- Develop recommended alternative guidelines and approaches for consideration by the Commission.

The goal is the developing of a sound basis for the Commission to take more effective action in implementing the 4-R Act in accordance with its purposes. Therefore, each of the market dominance procedures suggested will be examined for potential impacts on shippers and rail carriers, including an examination of the impact on the financial condition of the rail industry. The alternative procedures are also to be examined for potential impacts on separate rates for distinct services and on peak, seasonal and regional rates.

USE OF STUDY RESULTS

The study results are intended for use of the Commission staff to support the Commissions deliberations and actions in carrying out the 4-R Act. The results will:

1. Provide a set of selected procedural alternatives to the Commission to consider in further implementing the Act's market dominance provisions.

2. Develop a comprehensive transportation data base and a qualitative market analysis which can be jointly employed to create additional procedural alternatives by addressing such factors as placement of burden of proof, the level of threshold tests, the scope of maximum rate control, and the stringency of evidentiary requirements.

3. Create a balanced framework which permits the assessment of alternatives for implementing the Commission's market dominance responsibilities including theoretical consistency, effectiveness in shipper protection, contribution to adequate rail revenue, and practicality of application.

4. Place the market dominance issue in its proper perspective as one element of a complex program for modernizing rail regulation, thus contributing to the Commission's analysis of re-regulation options.

5. Further the Commission's economic research on the functioning of transportation markets and the interaction of such markets with regulatory programs.

BACKGROUND

Congress passed the 3-R Act[1] in January, 1974 in response to the Penn-Central bankruptcy and the continuing deterioration of the financial and economic health of the rail industry. This Act provided the framework for reorganizing the bankrupt railroads of the northeastern quadrant of the United States. The methods used included establishing USRA and RSPO[2] and special statutory procedures and standards for restructuring the northeastern rail system. Congress passed the 4-R Act in February, 1976[3] based in part on its experience in implementing the 3-R Act requirements and a concern for the financial condition of the entire rail industry. This Act provided for:

- Refined implementation of ConRail under the USRA Final System Plan.
- Regulatory reform and revision of rail ratemaking.
- Special programs to support financing of rehabilitation and improvement.
- Special provisions to facilitate railroad mergers and consolidations.
- The Northeast Corridor Project for improved high-speed rail passenger service.

The 4-R Act directed the Interstate Commerce Commission (ICC) to modify many of its existing procedures and to revise its rail ratemaking practices based on the new standards and concepts contained in the Act. The Commission responded by initiating research, procedural, and organizational studies and a number of formal Ex Parte Proceedings to implement the Act. The most significant of these for purposes of this study was Ex Parte

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1 Regional Rail Reorganization Act of 1973 (Public Law 92-236).

2 "USRA" is the United States Railway Association and "RSPO" is the Rail Service Planning Office of the Commission.

3 The Railroad Revitalization and Regulatory Reform Act of 1976 (Public Law 94-210).

320, which initiated implementation of those ratemaking provisions relating to market dominance, and Ex Parte 353, which addresses the Section 205 requirements to develop and promulgate standards and procedures for establishing adequate rail revenues. In response to the 4-R Act and continued public interest in deregulation, the Commission recently began a process of reviewing its regulatory functions to further advance the new regulatory policies set by the 4-R Act.

Section 202(b) of the 4-R Act introduced a number of new concepts and procedures for rail ratemaking. It provided that no rate can be found to be unjustly or unreasonably high unless the Commission finds that the proponent carrier has "market dominance" over the service of the traffic involved. This new "market dominance" concept refers to an absence of effective competition from other rail carriers or modes of transportation for the "traffic or movement to which a rate applies". Congress required the Commission to determine standards and procedures by which market dominance could be measured.[4] In addition Section 202(d) provides for seasonal, regional, and peak rates, a two year 7 percent no-suspension zone for rate increases, and separate rates for distinct services.

On March 10, 1976, the Commission issued a Notice of Proposed Rulemaking and Order which set forth procedures that would be used to determine if a rail carrier possessed market dominance over the traffic or movement to which a rate applies. This notice presented seven rebuttable presumptions which would be used to identify market dominant traffic in rate proceedings. In addition to the formal Ex Parte Proceeding, the Commission conducted a major research project[5] to evaluate the potential impacts of Section 202 ratemaking provisions and their implementation on rail carriers, other competing modes, and shippers. The approach taken at this time focused directly on implementation of the market dominance provisions since it was too early to consider relationships or potential changes arising out of other sections of the 4-R Act. Implementation of such regulatory changes had only begun at that time because of the short period of time since the passage of the Act.

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4 4-R Act Section 202(b); revised 49 U.S.C. 1(15)(d); recodified 49 U.S.C.

5 Contract No. ICC-76-6 conducted by A. T. Kearney, Inc.

After review of the research results and the information provided by railroads, shippers, DOT, and other interested parties, the Commission narrowed and revised the seven rebuttable presumptions in Ex Parte 320 to three. The three rebuttable presumptions result in a finding of market dominance when:

- The market share of the proponent carrier is 70 percent or more of the involved traffic.

- The rate at issue exceeds the variable cost of providing the service by 60 percent or more.

- Affected shippers or consignees have made a substantial investment in rail related equipment which prevents or makes impractical the use of another carrier or mode.

The initial application of the market dominance concept has involved a period of experimentation and learning for all the parties involved. Between October 1976 and July 1977, there were 39 protests which claimed market dominance. Based on initial experience and completed research study, the Commission submitted a report to Congress on the impact of Section 202 railroad rate making provisions in October, 1977.[6] Key findings of the report were:

- Data requirements may delay the use of the Section 202 provisions.

- Carrier action with experimental ratemaking has not been significant.

- Railroads will require time to implement the opportunities for new innovative pricing policies.

- General rate increases discourage experimental ratemakjng.

- Particular Section 202 provisions have varying potential for success.

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6 ICC, The Impact of 4-R Act Railroad Ratemaking Provisions, (Washington, D.C.: ICC, Oct. 1977).

A subsequent summary report reviewing cases in which market dominance was at issue was prepared by the Commission staff.[7] The report confirms shippers' difficulty in understanding the statutory concept of market dominance and suggested that the presumptive tests may be the cause of such difficulty. The review of the cases also revealed the inadequacy of the existing market dominance regulations in dealing with the issues of adequate revenue, the maximum reasonableness of rail rates, and publication of special rates for distinct services.

Ex Parte 320 contemplates the continuing review of the Commission's initial standards and procedures for determining market dominance. Experience under the current procedures has been accumulating and it appeared useful to study alternatives for further refining the Commission's concept of market dominance. Experience with the market dominance concept to date has suggested a need to re-examine the procedures for implementing Section 202. In addition, other regulatory initiatives being developed by the Commission will have significant interactions with the working of the market dominance provisions. These include initiatives to deregulate some rail services, encouraging increased use of contract rates, and more precise definitions of adequate revenue levels. The Commission has already deregulated rail traffic on fruits and vegetables (Ex Parte 346) to permit the railroads to become more competitive with the other modes. The need to assure the railroads adequate revenue is being explicitly studied in Ex Parte 353. Private rate negotiation was encouraged by the Commission (Ex Parte 358) to stabilize rail revenue and to encourage rail investments.

The Commission staff determined that these additional initiatives should be examined together with market dominance to further develop rail regulatory policy responsive to the requirements and intent of the 4-R Act. Among the actions taken as part of a re-examination of market dominance procedures the Commission staff developed a research plan to develop and evaluate alternatives for implementing the market dominance provisions in context with other regulatory matters particularly those associated with adequate revenue levels. A. T. Kearney, Inc. was selected to conduct this research[8] entitled, "A Study To Perform an In-Depth Analysis of Market Dominance and Its Relationship with Other Provisions of the 4-R Act".

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7 Bureau of Economics, ICC, A Comprehensive Review of Market Dominance Cases Oct. 1976 - May 1978, (Washington, D.C.: ICC, July 5, 1978).

8 Contract No. ICC-78-C-0017 awarded September 30, 1978.

This document constitutes the second interim report of this research program and analyzes the concept of market dominance in two principle frameworks: first, multimodal competitiveness; and second, alternative measures for dividing the railroad traffic into market dominant and non-market dominant segments. Since certain aspects of the research are still in the process of refinement, the interim report is to stimulate discussion of the concepts and analyses used in developing alternative standards. The impact of these alternatives on the Commission's other rail regulatory responsibilities is still being analyzed.

STUDY POLICY GUIDANCE

Kearney requested guidance from the ICC staff on assumptions to be used in projecting any evolving rail regulatory policies in order to carry out the study research program. This guidance covers issues which may or may not have an established official Commission position. This is particularly true of those subject to on-going Ex Parte proceedings. However, the guidance does represent an explicit assumption of the policies under which the study research was undertaken. This is a necessary step to avoid encompassing too broad an area within the scope of the study research itself or to commit resources to statistical and economic analyses that will not meet the future needs of the Commission.

The study guidance indicated that the Commission is continuing to move toward greater reliance on competition, ratemaking freedom, and carrier-initiated decisions to achieve the goals of the 4-R Act. Key elements of this new direction are to:

- Emphasize pricing and competitive market forces as a means of allocating transportation resources in competitive markets.

- Promote flexible and specific ratemaking to foster development of adequate revenues and to improve utilization of rail resources.

- Emphasize prospective revenue in relation to prospective costs in reviewing reasonableness of regulated rates, including adequate compensation of mandatory investments.

- Promote individual carrier management initiatives and remove constraints to making new investments and withdrawing from older, unprofitable or marginal investments.

  Emphasize more flexibility in asset utilization and deployment within the modified regulatory framework.

- De-emphasize general rate increases to encourage specific evaluation of costs, returns, and investments associated with the rail markets served in relationship to pricing and service offered.

- Encourage rail management to develop the information base needed to improve cost and revenue estimation for individual tariff changes.

- Reduce the potential to obstruct the adoption of the pricing philosophy contained in the 4-R Act by preserving historic rate relationships through actions based on unsupported allegations of discrimination and undue preference.

- Grant general exemptions to regulation on a liberal basis if regulation is:

  -- unnecessary to carry out national transportation policy

  -- an unreasonable burden

  -- of little or no useful purpose

- Encourage parties to resolve service issues on a voluntary basis by use of contract rates and other voluntary negotiated relationships.

- Recognize that, due to varying risks, common carrier rates may well be higher than those for contract rates which provide for shipper assumption or sharing of risks involved.

- Recognize that regulation and regulatory action can not be effectively designed to:

  -- assure the profitable use of unneeded rail assets or poorly managed rail operations

  -- require the furnishing of service that does not recover its costs.

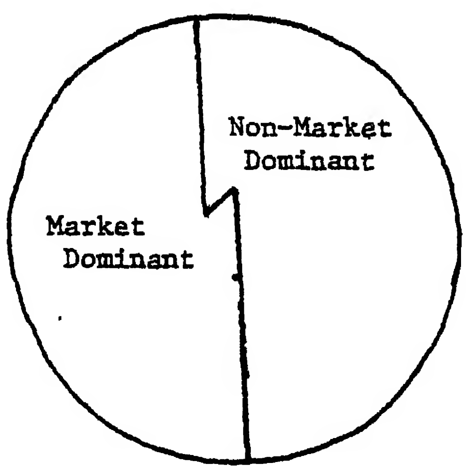
- Emphasize full, creative use of provisions designed to ameliorate impacts associated with withdrawal of service by rail carrier management to protect the interests of captive shippers and affected communities while assuring that such programs do not unduly interfere with the ability of carrier management to redeploy rail assets on a timely basis.

- Assure continued regulatory attention of critical national programs such as safety, environment, and energy.

CONCEPTUALIZATION OF THE PROBLEM

The key analytical problem of the study is developing a conceptual and empirical basis for categorizing rail traffic into two groups--market dominant and non-market dominant. Maximum rate levels will not be regulated for the non-market dominant segment and will be regulated for the market dominant segment. This can be simply viewed as establishing the boundary between two segments of the rail traffic "pie".

Rail Market "Pie"



Unfortunately, this approach is much too simplistic. The effectiveness of the market dominance concept is critically dependent on a number of interrelated factors including:

1. The Classification Method, its Detail, and its Parameters. How do location, commodity, industry, movement characteristics, and other pertinent factors affect a determination of market dominance? Should classification be by groups of movements (e.g. types of commodities or distance) or individual movements be classified independently of the group?

2. The Form of Regulation to be Applied to the Market Dominant Traffic. How should rate regulatory policy be formulated to encourage continued investment, yet protect captive shippers against abuse of market power?

3. The Relative Role of Contract Rates or Shipper Bargaining Power. In a regulatory program that includes both market dominant and non-market dominant traffic, how are the roles of contract rates and shipper bargaining power defined and balanced?

4. The Resolution of Allegations of "Discrimination and Undue Preference". In the regulatory actions applicable to different segments of the rail transportation market, how will traditional sections 2, 3, and 4 on discrimination issues be handled?

5. The Relationship Between Railroads and Shippers When Both Parties are Involved in Large Scale Transactions. Involving both market and non-market dominant transportation services, how will issues of maximum rate regulation and discrimination be handled when both parties have substantial transactions?

6. The Time and Cost Associated With Regulatory Proceedings. What monetary and institutional costs will be associated with administration proceedings in which market dominance issues are resolved?

7. Deregulation of Segments of the Market. How will deregulation affect the impact of alternative market dominance concepts?

The impact and practicality of any alternative standards and procedures for implementing market dominance provisions will depend on the answers to these issues. It should be emphasized that the relative importance of market dominance considerations depends, in part, on the overall regulatory program applied to those various types of traffic that are defined by this study.

Thus, the exact boundary (or the disposition of the "gray" indefinite area inherent in developing only empirical analysis distinguishing different degrees of competition) may be less important for certain segments of traffic if an overall policy of rail regulatory reform achieves the 4-R Act goals. It is important to note that both competitive and non-competitive rail traffic should presumably benefit from the regulatory initiatives being developed. Market dominant traffic will not be subject to the "traditional" past rail regulatory framework, but to a framework consistent with the principles expressed in the guidance furnished Kearney by the Commission's staff.

Thus, the substantial rate freedom would be reflected in the rail marketplace through a number of other interrelated policies under consideration by the Commission:

1. Non-market dominant traffic may not be subject to rate regulation.

2. Voluntary contractual relationships may be subject to substantially less rate regulation since such relationships are not normally contested by the parties.

3. Traffic currently considered market dominent but containing substantial investment and service risks for the railroads (such as that associated with unstable demand) might be regulated on a different basis, such as requiring contract negotiations in good faith by all parties or developing special flexible tariffs for that traffic not moving under contract.

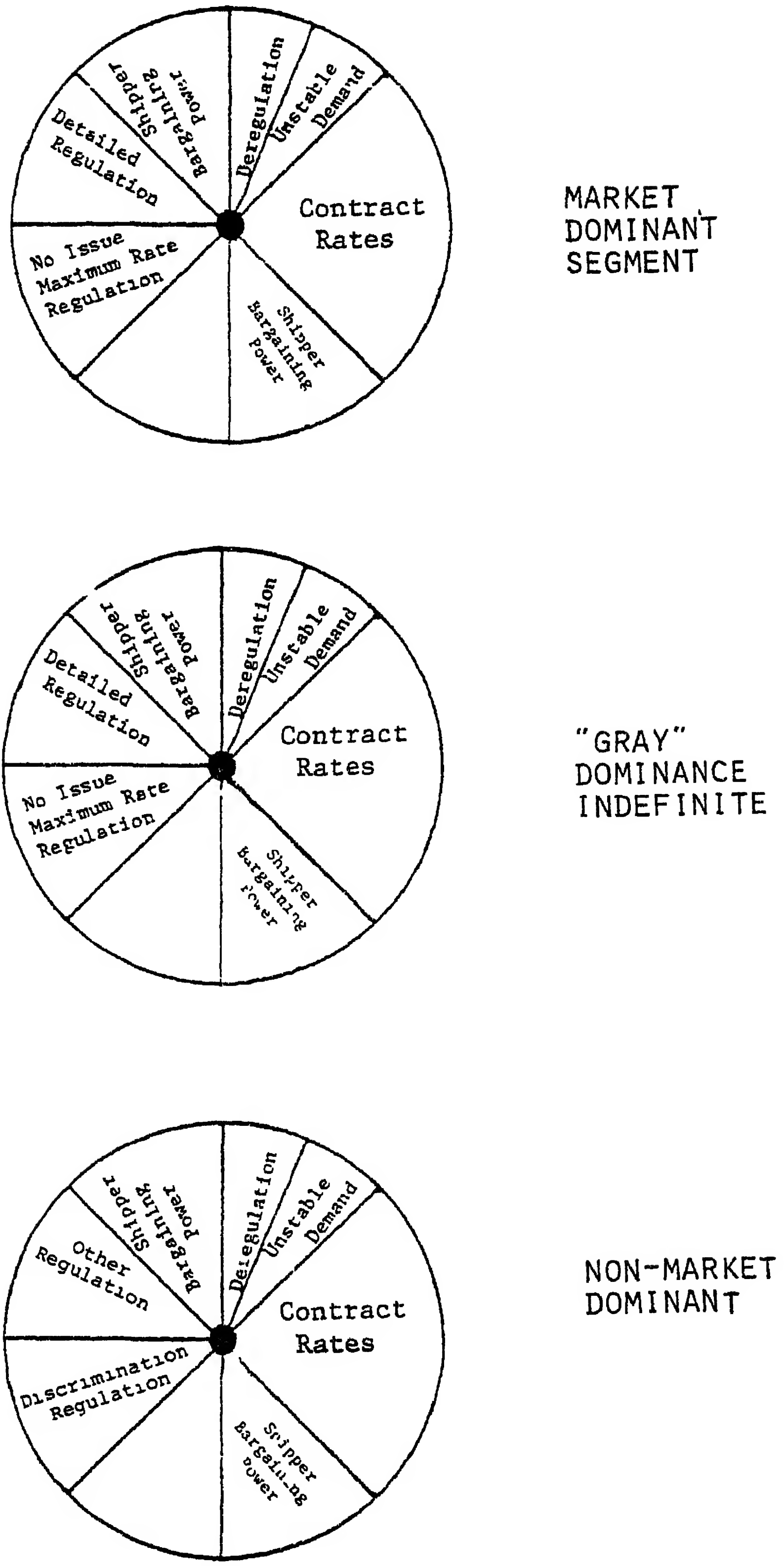
4. Rates for market dominant traffic involving substantial shipper bargaining power might be reviewed on a different basis than other traffic (if not contracted).

5. Rate regulation might include development of guidelines for reasonable maximum rate levels thus removing a large percentage of current rate disputes from case by case litigation.

Viewing the rail traffic "pie" based on these regulatory factors would result in the classification shown in Figure I-1 on the next page.

FIGURE I-1

Rail Market "Pie"



These "pie" segmentations indicate that although the "gray" indefinite area under market dominance is large there may be little need to narrow it in light of the long term economic and regulatory framework within which maximum rate regulation is an issue. Market dominance should therefore be viewed in the context of the direction any re-regulation program takes. It should be designed to make a practical procedural contribution to removing rate regulation where it is not needed. However, it should not carry an "undue burden" for achieving other re-regulation goals and should be considered and evaluated in the context of other regulatory initiatives that may limit its ultimate significance.

KEY ISSUES

The analysis of market dominance can not be divorced from a number of key issues surrounding its implementation. These issues arise from the past and present implementations of the market dominance provisions and they reflect the economic constraints which any set of guidelines or procedures must address. The difficulty in resolving the issues raised by these constraints comes from their interrelationships. Some of the issues are also conflicting in nature, for example an undue concern for rate freedom may be inconsistent with the concern for shipper protection. The key interrelated issues to be addressed in developing alternative procedures and standards of market dominance are discussed below.

1. Equity considerations involve the degree of protection to be offered a group or segment of less than wholly competitive traffic. This involves the weighing of the over-all public interest in practical, simplified regulation against the individual shipper's needs for protection against abuse.

2. Transition issues are associated with short-run costs and disadvantages will occur in adapting to longer run economic conditions. The modern transportation market has developed over an extended period. The potential for abuse, mistakes, etc. may be high in the short run while adjustments to the new re-regulation program are being accomplished. Transition issues need to be carefully considered in the analysis.

3. Procedural practicality and institutional costs of participation by railroads, shippers (particularly small shippers), and other interested parties are important issues. Information requirements should be within the means and access of the average participant. Concepts must be both sound theoretically and also understandable to the middle management personnel participating in the regulatory process.

. . .

4. "Protection" of parties from exercise of market power means preventing railroads from exploiting captive shippers without effective alternatives and preventing shippers with substantial bargaining power from obtaining "undue" favorable treatment from one railroad.

5. Continued requirement that railroads provide common carrier service needs to be assessed in terms of the 4-R Act's intent to assure either adequate revenues and/or ability to terminate service. This is particularly true as cross-subsidization of traffic is implicitly eliminated by the intent of the Act. The timely ability to redeploy rail assets thus is critical in both the market dominant and the non-market dominant sectors. Ratemaking freedom implies greater management ability to make timely investment/disinvestment decisions if the intent of the Act is to be obtained.

6. Railroad consolidation is a likely trend. How will larger, stronger, more geographically pervasive railroads affect the environment in which the market dominance and other new regulatory considerations will function?

7. Collective ratemaking is exempt from anti-trust laws under the Reed-Bulwinkle Act and the status of the exemption has been questioned. Consideration of discrimination issues has often been raised under value of service concepts as well as cross-subsidization concepts. What new approaches to "discrimination" are needed as part of a policy of increased freedom in setting rail rates?

8. Short term problems in allocating limited equipment supplies interact with rate regulation of market dominant and non-market dominant segments. How should differences in rates based on different supply conditions (e.g., backhaul) and which result in shipper competitive advantage be handled when rates have been maintained in a rigid structure and competitive differentials were stable? What constitutes legitimate public policy concern for "injury" due to "abuse"?

9. Difficulty and complexity exist in developing adequate generalizations about rail service market conditions. Rail service is geographically pervasive and serves the entire range of industry with transportation operations of many diverse and unique types. Nevertheless, accurate characterization is necessary both for analysis and for implementation.

CRITICAL ASSUMPTIONS/SCOPE

A. T. Kearney, Inc.'s research effort is primarily focused on developing alternative standards and procedures for implementing the market dominance provisions of the 4-R Act. The feasibility of our approach is critically dependent on assumptions of the feasibility and effectiveness of other aspects of the evolving regulatory program. The concepts presented in the study policy guidance represent critical assumptions underlying many of the conclusions on the alternative standards and procedures recommended in this report.

RESULTS TO DATE

In this initial phase of the project, A. T. Kearney, Inc. accomplished the following:

- Examined the concepts of market dominance and market competitiveness in terms of intermodal and intramodal competition.
- Examined the various issues surrounding the implementation of market dominance, such as adequate revenue, abuses of market power, ratemaking regulations, rail abandonment, rail investment and cross-subsidization.
- Developed an outline of a conceptual framework in which to analyze market dominance alternatives.
- Analyzed alternative measurements of market competitiveness.
- Designed several empirical analyses to identify market dominance.
- Established a data base for its ongoing empirical analyses including a unique enhancement of movement specific data elements for the 1% Waybill Sample covering rail costs, truck costs, market share trend data, contract rate susceptibility and other innovative measures.

- Applied alternative measures of market competitiveness to the 1% Waybill Sample on an individual movement basis.

- Performed a qualitative market research assessment of the market position of rail transportation in physical distribution and logistic patterns of selected key industries.

- Applied an evaluative framework incorporating seven independently derived measures of competitiveness.

- Integrated the empirical research with the prior procedural and regulatory analysis.

- Developed and analyzed selective alternatives for implementing market dominance provisions.

II - MARKET DOMINANCE AND RAIL REGULATORY REFORM

Market dominance both as an intellectual construct and as a practical feature of rail ratemaking procedure does not exist in a vacuum. From one perspective, it is an integral part of a complex framework of regulatory policy and procedures which are a product of the 4-R Act, prior legislation, and the Commission's historic precedents in ratemaking. From another perspective, market dominance constitutes the centerpiece of a legislative effort to launch a new concept in government regulation of the rail industry.

In prior years, regulation had either been applied to functional areas (i.e., worker safety, environmental protection, stock sale and transfer) throughout all industries, or it had been applied comprehensively to a single industry (i.e., railroads, electric utilities, etc.) through rate regulation, entry/exit barriers, and other elements of detailed economic controls. Then in 1976, with the advent of the 4-R Act, Congress introduced a substantially different concept of tailored regulation -- with the type of regulation not based on functional areas but on market segments defined by the presence or absence of competition. Thus, the rates for a given type of railroad service may be regulated or not regulated or both, depending upon the transportation characteristics of the markets in which the service is being sold.

This new approach to regulation was adopted in the recognition that the railroad competitive environment has changed, and regulation in its present form (or at least its pre-4-R Act form) may not be aligned with the realities of the transportation market. To the extent that this is true, any new procedures for market dominance implementation must be viewed in the context of the spirit of the 4-R Act and the need to tailor all aspects of the regulatory process to the realities of each major type of rail traffic.

This study is focused on market dominance and problems with its implementation. Since the market dominance concept plays such a central role in the re-examination of rail regulation, Kearney determined early in the study that a broader view of rail regulation was required before focusing on market dominance. This initial integration of market dominance and new

regulation was necessary to develop new standards and procedures for implementing market dominance, and to provide a sound theoretical basis for evaluating alternatives conceived during the study.

This integrated approach gradually evolved into the conceptual framework for Rail Re-Regulation presented in this chapter. The place of market dominance in this framework is central to the study plan and addresses all aspects of the market dominance question. The framework also helped to establish the theoretical basis for market dominance and to develop theoretically correct and practical approaches to identifying where it occurs.

OVERVIEW OF THE CONCEPTUAL FRAMEWORK FOR RE-REGULATION

The analysis of the conceptual framework begins with a brief review of the railroad industry structure and its competitive environment to identify the areas of potential need for government regulatory intervention. In addition to this industry analysis there is a definition of public interest objectives of transportation regulation. From these two elements it is possible to classify (at least conceptually) the segments of rail traffic according to the relative need, if any, for regulatory involvement. Finally, given this segmentation and the public interest objectives defined, it is possible to develop regulatory tools which can be applied to each segment to achieve those objectives. The following four sections deal with each element of the framework in turn.

RAIL INDUSTRY STRUCTURE

For many years railroads were considered and treated as classical economic natural monopolies. Such firms were believed to have declining cost curves (economies of scale) that induced them to reduce rates until a single carrier would prevail in each market. The successful carrier, as the only remaining transporter of goods, would charge a monopoly price. Such a price would not result in the most efficient allocation of transport resources. Further, railroads were engaging in uncompetitive behavior (e.g. discrimination) raising the issues of shipper exploitation, fairness, and equity. It is these considerations which provided the justification for railroad and public utility regulation in the early years of this century.

The regulatory framework created for the Commission attempted to prevent shipper abuse through three means: first, by preventing the railroads from coalescing into giant monopolistic systems (entry control was shifted from an antitrust framework to administrative regulation in the Transportation Act of 1920) through control of mergers; second, by minimum and maximum rate regulation which limited the carriers' price competition to a "zone of reasonableness" and third, by eliminating practices of shipper discrimination and undue preference. From its earliest time, the Commission dealt with issues of fairness and equity and became more involved with efficient resource allocation, as transportation policy evolved in response to the increased competitive pressures of other modes, particularly since World War II. It was this regulatory framework which existed with minor modifications until the 4-R Act.

The natural monopoly concept of the railroads has been increasingly questioned in the last twenty years. While most railroads evidence declining unit costs at higher volume levels,[1] the presence of a major new competing technology with an entirely different cost structure and often cost competitive with rail has fundamentally altered the competitive position of rail technology. This especially true if total transportation, i.e., total distribution costs are considered. The result is a paradoxical situation of an industry which has the internal characteristics of natural monopoly, but has been prevented from coalescing into its lowest cost, minimum competitive form, while confronting intense competition from different segments of the transport industry, primarily truck and barge carriers.

This paradox has resulted in a steady shift of higher value/higher rated commodities to motor carriers whose superior service outweighs any freight rate differential advantages of the rail mode. This shift is responsible for the very slow growth of average rail revenue per ton since the 1930's -- a severe problem when compared to the rapid increase in rail labor and material costs. While some of this differential has been offset by major improvements in labor productivity (achieved through longer trains and larger cars), the overall result has been a decline in return on investment to its lowest point since 1919; barely two percent.

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1 Although some carriers such as ConRail seem to be displaying some diseconomies of size and also overbuilt roads may have lower unit costs from volume increases due to better utilization of overbuilt capacity.

The outlook for the industry as a whole continues to be uncertain. As motor carriers' efficiency improves and rail costs rise faster than productivity gains, truck rates for more and more commodities will continue to approach or even fall below comparable rail rates. Many rail carriers have expressed the view that rate regulation has made it difficult for them to respond quickly to changes in the marketplace. However, the limited use of such ratemaking freedoms as have already been allowed by the 4-R Act, suggests that a combination of competitive pressure, unimaginative railroad marketing/pricing, and regulatory factors have brought about the present situation. The role of the regulatory process is most noted in its failure to permit exit from unprofitable markets in a timely fashion that permits railroads to redeploy assets to more productive uses and thus better serve the markets where they retain a competitive advantage.

There has been a shift in the railroad's competitive advantage over the last 30 years. Increasing labor costs have made terminal and classification functions relatively more expensive. As a result, single car movements and very short movements are increasingly not cost competitive with motor carriers. The railroad's strength appears to lie in the realm of high volume, long haul traffic where the regularity and size of the movements permits such labor saving innovations as high capacity specialized cars, unit train operation, and special run-through services. In such movements, the railroad becomes an integral part of the materials handling system for a set of closely interrelated processing/distribution functions. The close coordination between auto parts train schedules and automobile assembly plant operations is a prime example of this. As this trend progresses, the railroads may become less well equipped to handle a random flow of general purpose cars, moving in relatively unpredictable patterns, and requiring repetitive switching and classification. This trend raises a serious question whether the traditional concept of rail common carriage is economically feasible in the current environment.

This brief sketch of the rail industry structure and competitive environment suggests a far different regulatory environment than the one conceived when the rail industry was among the fastest growing and most profitable businesses in the country. Clearly, there are segments of truck/water competitive traffic where the need for regulation is different from the non-competitive traffic. Also, the role of intramodal competition may diminish as the merger movement proceeds, and regulatory policy should recognize this trend. Lastly, the need to adjust the

industry's physical plant to current market needs must be considered in any revision of the regulatory framework. In other words, regulation must be tailored to the needs of each market segment, while recognizing its impact on (and optimizing its effects on) the rail industry as a whole. In the next section there is a discussion of the objectives of transportation regulation, which leads in turn to an approach to traffic segmentation for regulatory purposes.

REGULATORY FRAMEWORK

From the previous discussion, three key public interest objectives for transportation regulation can be identified.

- Protection of shippers from abuse of market power.[2]

- Economically rational and efficient allocation of transportation resources.

- Adequate revenue for transportation companies.

Rail regulation was originally concerned primarily with protecting shippers from discriminatory rates and other market power abuses. At the time, most railroad companies were earning adequate revenues; those that did not were either deliberately overbuilt, overcapitalized, or mismanaged. Issues of economically rational allocation of transportation resources were of little interest to the public at large. It was not until the financial failure of most of the rail industry in the Northeast (and the resulting burden of public subsidies) that the needs for adequate revenue and economic efficiency have become pronounced public interest objectives of regulation. The continuing large deficits of ConRail in particular have resulted in heightened public concern.

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2 The term "market power" is used to designate the potential ability to utilize practices employed under classical economic monopolistic or oligopolistic conditions by firms to exploit their market position. These include exploitive pricing, discrimination, tie-in sales, and other non-competitive market behavior.

Economists would argue that economic efficiency is a goal that should always have been pursued. Throughout recent history, the government involvement in transportation (from the building of the Interstate Highways and waterways to the provision of the air traffic control system) has rarely been influenced by efficiency considerations. Thus, pure economic efficiency can no longer be achieved directly and additional modifications of the market may be required to approximate it (as suggested by the economic theory of "second best"). Thus, adequate revenue as a regulatory objective cannot be divorced from economic efficiency. Moreover, one long-run alternative to adequate revenue levels, i.e., government ownership of the railroads, is the solution that appears least likely to lead to efficient allocation of transport resources.

Each of the three objectives has a long-run and a short-run component. In the long run, regulation must be constructed to anticipate the principal market defects when many of the rail markets are freely competitive and to develop corrective procedures. In the short-run, regulatory design must allow for the inevitable transition effects, as markets where rates and service have been regulated for nearly 100 years are shifted toward lessened federal control of pricing actions.

In the following subsections, each objective is discussed in detail. Efficiency in the allocation of transportation resources and adequate revenue are given priority.

(a) Protection of Shippers

Shippers must be protected from a variety of abuses and unethical practices to the extent that transportation alternatives are not reasonably available. Rebates, discriminatory prices, shipper/carrier collusion to destroy competitors are now illegal and should so continue. It is one thing to protect shippers from such abuses, another to protect them from the vicissitudes of technological change and shifts in competitive advantage. The risks of such changes and their possible adverse consequences are borne by virtually every industry in the unregulated sector. Therefore it is inappropriate for government to protect transportation buyers from the impact of economic change by regulating the cost of transportation.

For example, the shipper who has enjoyed low rail rates for years may suddenly face major rate increases. This may result from the fact that his service was once a by-product of a high volume transportation service provided to one or more other shippers located in the same geographic area or on the same rail facility. For one reason or another, rail transportation is no longer economically attractive to those other shippers. Under such circumstances the shipper faces technological changes which may cause his transportation costs to rise to the point where the shipper must find alternative sources of transportation, reduce the scale of business, or cease business altogether.

Protection of a shipper in this circumstance through the long-run regulation of rates is inappropriate. If the threatened producer is considered socially essential, then the government should provide direct subsidy, transportation cost subsidy or some other form of assistance. However, in the short-run, to the extent that the change in rail rates is the result of rates rising to the compensatory level after many years being artificially depressed due to earlier regulatory policy, simple justice would dictate a transitional period imposed by regulation. This gives the affected shipper time to seek transportation alternatives or to redeploy his assets.

Existing rate structures contain numerous examples of rate relationships promoted by regional groups or governmental units to equalize or obtain competitive advantage. Such rate structures often contain a significant number of individual non-compensatory rates. While a short run transitional cushioning of rate rationalization is reasonable, the railroads can no longer be cast in the role of the "great equalizer" at the expense of their own revenue adequacy. If old rate relationships run counter to current realities of rail costs, the rates should not be frozen forever in the interest of "protecting shippers." The upward adjustment of individual rates within an existing rate structure highlights the relationship of market dominance to traditional issues of discrimination.

(b) Economic Efficiency

Ideally, each movement of goods would be handled by the mode which provides the transportation at the lowest total cost to society. This cost would include not only the costs incurred directly by the transport company but also those incurred by

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society (such as roads and streets, traffic police, grade crossing separation, etc.) which are not internalized by the firm and passed on to the shipper. As mentioned above, such an ideal allocation of resources is probably impossible in this country as long as significant portions of the highway, street and waterway infrastructure are supported by general taxation.[3] Nevertheless, to the extent that rail costs can be determined, rail rates which differ substantially from cost in non-competitive markets are unlikely to yield optimal allocation of the railroad's economic resources nor to result in optimal allocation of the resources of the users of rail services.

Railroad companies should ordinarily employ their assets in services which return at least the firm's cost-of-capital on those assets. To the extent this goal is achieved, the assets will be efficiently employed. When regulation is applied in ways that will affect the deployment of assets, a procedure should be developed that replicates as closely as possible the criteria applied in free markets where entry and exit are unresricted. For example, if cars or services are provided by regulatory order, the regulatory body should permit a rate for the use of those assets equal to the return they would earn if employed in free market services. If this is impossible, but the provision of equipment or service is deemed socially desirable, then the cost of this allocation should be borne by the government through operating subsidy or purchase of the assets in question.

In the long-run, the efficient allocation of resources will have to be addressed directly in the formulation of national transportation policy. As the costs of maintaining existing highways and waterways continue to rise, pressures will mount for more systematic transfer of these costs to users of publicly provided facilities. So long as this transfer of costs is incomplete (as in the case of coal roads in the Appalachian Region) it may in fact be necessary to subsidize rail operators with government funds even though the total economic cost of rail service is below that of motor carriers.

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3 The measurement of government tax and subsidies involved in the transport sector is not generally agreed upon. Further, how to deal with these issues in the "theory of the second best" to analyze resource allocation efficiency is empirically indeterminate.

(c) Adequate Revenue

Assisting railroad companies to obtain adequate revenues is a statutory objective of regulation. There is no more challenging a question in the transportation field than the achievement of adequate revenues for the railroads as part of regulatory policy and procedures.

The core of the adequate revenue objective is shaping regulatory policy to remove unnecessary barriers that may prevent carriers from achieving adequate revenues. The 4-R Act contained one provision specifically directed to this end. It permits a railroad to raise non-compensatory rates to the variable cost level without Commission suspension or investigation. Despite this limitation, relatively few rate increases have been filed to raise non-compensatory rates -- few considering the 1975 ICC Burden Study indicated that nearly 30 percent of all interstate rail tonnage moved at non-compensatory rates.

A more analytically precise and practical approach may be that the regulatory body must assure the railroad full opportunity to earn adequate revenues whenever regulation dictates that specific assets must be committed by the railroad. In other words, if a car fleet of a given size is mandated as the only means of insuring the railroad's performance of its common carrier obligation, then regulatory policy should allow the railroad to earn its cost of capital on the investment required to maintain the car fleet at the established level (at prospective purchase prices for the equipment if new cars must regularly be acquired). If competitive conditions do not permit the railroads to charge a fully compensatory rate, then it can be concluded that, the Commission should not mandate the acquisition of assets or provision of service as the railroads cannot be assured of adequate revenue.

A similar line of reasoning applies to segments of routes, either system segments or individual branch lines. If fully compensatory rates approved by the Commission will not move sufficient traffic to return adequate revenue on such route segments, then a regulatory mandate for service on these segments is indefensible. Either exit from the market must be permitted (possibly with a transition period) or, as indicated previously, the assets subsidized or acquired by others (including possibly the government).

Given this logical framework adequate revenue is inextricably connected to the common carrier obligation and regulatory policy regarding line and service abandonment. The short run ability of regulatory policy to achieve adequate revenue for the industry directly is limited to that traffic which carries a full complement of regulatory controls including common carrier obligation, maximum rate limits, and entry/exit restrictions. In the long run, overall improvement of railroad company revenue levels can only be achieved by freedom of entry into and exit from geographic and commodity markets in a manner permitting timely redeployment of railroad assets to their most productive uses. Where this redeployment will ultimately lead is difficult to predict; however, in the absence of a major change in the structure of user charges for highways and waterways, the profitable rail system which emerges from the necessarily long transition period will probably be significantly smaller than the present one and be oriented to high volume, bulk transport.

SEGMENTING THE TRAFFIC

The discussion on rail industry structure contains an assumption that segments of rail traffic with different market conditions require differing approaches to regulation. Given a clearly defined set of objectives for regulation it is possible to propose segmentation (at least conceptually) which identifies traffic with differing needs for external market control. There are limitations to the effectiveness of competition in markets for rail transportation which require intervention to achieve the regulatory policy objectives:

1. Some shippers are subject to the potential for longterm abuse of market power. These shippers are those which have no viable alternative to the rail service they are currently using or which lack effective countervailing bargaining power. ("Viable alternatives" will be discussed later in this chapter.)

2. If large shippers are served by more than one railroad (a fairly common situation), they may exercise their bargaining power with the railroads to extract inordinately low rates or to attempt to obtain advantages that may injure their smaller competitors.

3. Overall revenue levels in the rail industry are inadequate. This is attributable to a combination of large shipper bargaining power, prior rate-making policies, the competitive advantage of motor carriers (especially private fleet), and restriction on exit from markets. (There are obviously management and operating efficiency factors also, which are beyond the scope of this study.)

This brief list of market defects suggests a segmentation of the traffic along the lines shown in Figure II-1 on the next page.

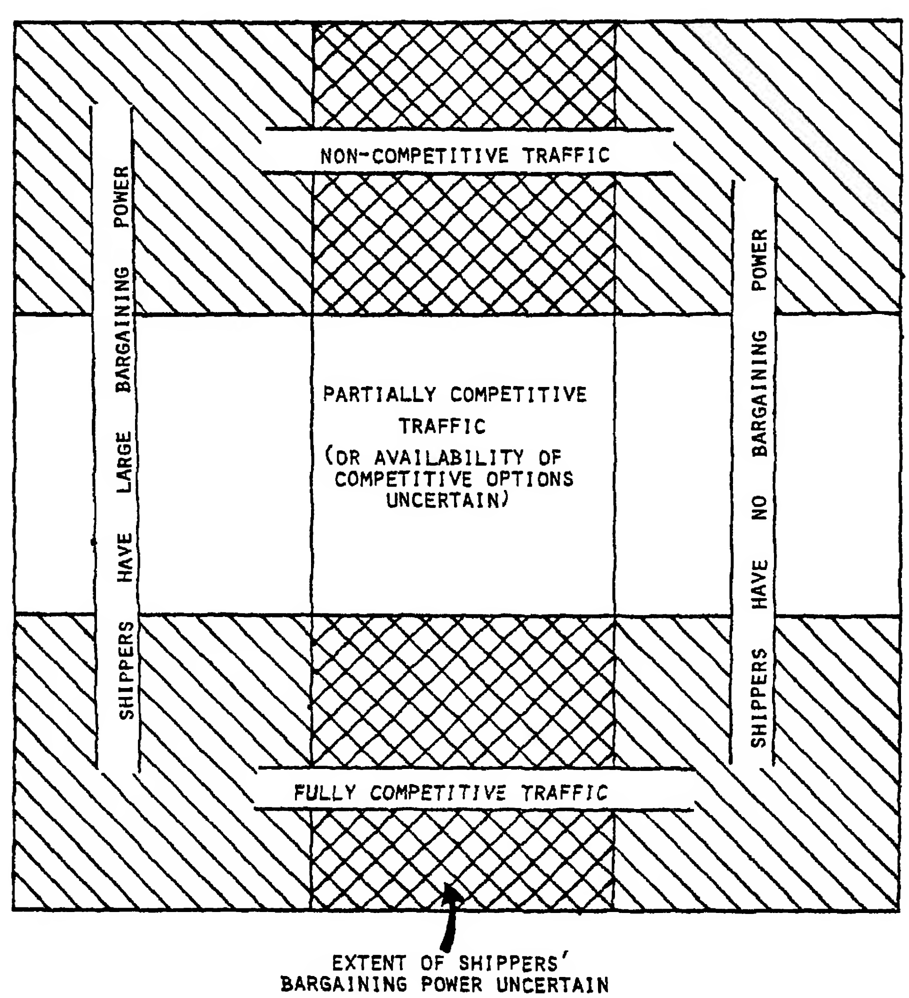
In Figure II-1, rail traffic is segmented first according to the level of competitiveness for the traffic. Some traffic is unquestionably competitive, some clearly not so. In between is an area of uncertainty ("gray" area) where, for example, only intramodal competition may be present (which may diminish through mergers or rate-bureau activity) or where the higher cost of highway or highway/water transport makes the viability of existing alternatives questionable.

Similarly, the extent of shipper bargaining power vis-a-vis the railroads varies from substantial to non-existent. Between the extremes is a large middle ground where shippers possess some bargaining power. Its extent may be very difficult to quantify. Of particular significance is the fact that the segmentation by levels of shipper bargaining power cut across segmentation by level of competitiveness. This apparent contradiction is explained by the fact that very large shippers are usually multi-plant or multi-product companies which utilize the threat of traffic diversion in competitive markets as a bargaining tool to negotiate lower rates on traffic that would otherwise be noncompetitive. Small shippers or those with no bargaining power either must accept railroad-set rates on non-competitive traffic or market-set rates on competitive traffic. Thus, the overlapping segmentation produces at least nine segments which potentially call for different regulatory responses.

Another segmentation is implied but not shown explicitly in Figure II-1. Each of the nine segments contains a proportion of non-compensatory traffic. This component of the traffic may (and in fact currently does) call for a different regulatory procedure.

Figure II-1

SEGMENTATION OF RAIL FREIGHT MARKETS



Given the definition of these segments and the definition of public interest objectives discussed previously, the next step is to examine regulatory action options which will be assembled into an integrated regulatory framework. This will be discussed in the following subsection.

DESIGNING A REGULATORY FRAMEWORK

In this model of regulatory design, the regulator has six tools available in various combinations to meet the needs of each traffic segment. Their utilization in an integrated regulatory framework will be presented after a brief summary below:

1. Maximum Rate Controls -- A limit which prescribes the highest rate the railroad may charge.

2. Minimum Rate Controls -- A point for rates below which justification must be presented that the rate is not discriminatory.

3. Entry and Exit Controls -- Rules which establish the procedure by which a railroad may enter or leave a market, most often developed as line abandonment procedures (since few new entrants into the rail market are expected).

4. Service Obligations -- Generally consists of those requirements imposed on railroads currently as common carriers, including due care in freight handling, reasonable dispatch in transit, and provision of cars for loading upon request.

5. Limits on Anti-Competitive Activity -- Prohibitions against discrimination, destructive competitive practices, collusion (under some circumstances) etc.; this may be enforced either by traditional Commission case law or by applying some or all of anti-trust law to the rail industry.

6. Segmentation Procedures -- Guidelines for identifying the transportation and commercial characteristics of a given service and piece of traffic to determine the type and extent of regulation applicable. This is of particular interest in the case of traffic falling in the "gray area" segments where the competitive nature of that traffic is not clearly defined.

In devising a regulatory framework for segments resulting from the analysis, the public interest objectives that can be met by the market and which must be achieved by regulatory intervention should be clearly defined. Then a selection must be made of the tools which will best accomplish the objectives.

For example, in the segment of the market which is non-competitive and where shippers have no bargaining power, the regulatory framework would call for protection of shippers through application of the five basic regulatory tools. Conversely, in the segment where the market is competitive and shipper bargaining power substantial, the only regulatory tools required for shippers protection would be a combination of minimum rate regulation and anti-trust controls to prevent collusion between a single shipper and a carrier that could prove injurious to the shipper's competitors. In this latter case, the objectives of adequate revenue and allocative efficiency would also be fully served by minimum rate controls to prevent inordinately low rates in the face of great shipper bargaining power even where such rates were not clearly discriminatory.

An appropriate mix of regulatory tools must be developed for each segment in a similar manner. While this study is not intended to propose regulatory framework options other than for the segmentation procedures, the relationship between the method of segmentation and the selection and application of tools must be recognized if the conclusions are to be useful to the Commission.

OVERVIEW OF THE CONCEPTUAL FRAMEWORK

All of the elements discussed in the preceeding pages formulate a conceptual framework for rail re-regulation that provides a useful perspective on the possible impact of reduced regulation and the role of market dominance. The entire conceptual framework is displayed in Figure II-2.

Figure II-2, on the following page, shows how the regulatory objectives described are employed both to guide rail traffic segmentation and to shape the ultimate regulatory framework. The regulatory framework, in turn, relates tools to segments in order to meet objectives. Finally, the performance of the rail industry, as a whole and in all its markets, must be evaluated to determine if the regulatory objectives are in fact being achieved.

This conceptual model is not all encompassing. For example, no definition of "noncompetitive" or "competitive" is given. Similarly, there is no rigorous definition of "shipper bargaining power." Simply identifying when a regulatory tool might be applied to a segment does not define the precise form of the tool

Figure II-2

CONCEPTUAL FRAMEWORK FOR RAIL-REGULATION

POSSIBLE MARKET DEFECTS IN RAIL INDUSTRY STRUCTURE

- Natural Monopolist
- Rate Discrimination
- Unfair Railroad Practices
- Inadequate Rail Revenue
- Injury Due to Substantial Investment
- Shipper Abuse

REGULATORY FRAMEWORK

Regulatory tools:

- Maximum Rate Control
- Minimum Rate Control
- Entry and Exit Control
- Service Obligations
- Limits on anti-competitive activity
- Traffic segmentation by market dominance

REGULATORY OBJECTIVES

- Shipper Protection
- Economic Efficiency
- Adequate Rail Revenue

to be employed. The segmentation procedures are crucial to treatment of the "indeterminate" or "gray area" segments; however, there is as yet no suggestion as to precisely how this segmentation should be performed.

Another issue not addressed by this conceptual framework is the practicality of applying the necessary tools to given market segments or the practicality of workable traffic segmentation procedures. Considering the criticisms of the current procedures regarding the availability of data, and the ambiguity of the existing standards and procedures, the need for workable procedures is a paramount constraint affecting all aspects of the theoretical framework. Procedural practicality and implementation problems will be discussed in Chapters VII and VIII of this report.

SUMMARY

The 4-R Act introduced a new concept of reduced rail industry regulation designed to conform regulatory activities to a changed transportation market. A new framework is needed to construct regulations to fit the evolving rail industry. Objectives of this new regulatory framework include:

- Protection of shippers from abuse of market power.

- Economically rational and efficient allocation of transportation resources.

- Adequate revenue for transportation companies.

The underlying assumption of these objectives is that government intervention should occur only if the market cannot achieve these goals and intervention can redress the market's inadequacies. This assumption requires the regulatory tools to be adjusted in their scope and direction. Segmentation of the traffic is one of the regulatory tools adapted to the new rail industry structure. This process directs the application of various tools such as maximum rate regulation, common carrier obligation and others to the various traffic segments as required by public policy objectives. In the next chapter, the conceptual framework is used as a means of identifying the issues which must be considered in an analysis of the market dominance concept and its relation to other provisions of the 4-R Act.

III - THEORETICAL BASIS FOR STUDY OF MARKET DOMINANCE

The principal goal of this study is to recommend new standards and procedures for determining market dominance. The effort is based upon the conceptual framework of rail regulating reform presented in the previous chapter. This chapter further develops the relationship between the conceptual framework and market dominance by analyzing three major topic areas:

- The scope of the study as shaped by the conceptual framework.
- Theoretical bases for defining and applying the market dominance concept.
- Other major conceptual and empirical considerations.

Each of these topics is addressed in a major section below.

STUDY SCOPE AND THE CONCEPTUAL FRAMEWORK

The previous discussion of the conceptual framework demonstrated that the public interest objectives of shipper protection, economic efficiency, and adequate revenue guide the segmentation of the railroad markets. If the public interest objectives are not or potentially would not be achieved by the workings of competitive forces in a given market segment, then some form of regulatory framework should be applied to that market segment. Two dimensions of segmentation were advanced as a first attempt to accomplish the required subdivision of the market: a measure of competitiveness and a measure of shipper bargaining power. The core of the study is the proper segmentation of the market first, on a theoretical basis; second, using empirical research; and third, using proposed regulatory procedures.

Since the segmentation of the market will be an on-going process, the design of the segmentation procedure is also a proper element of the study. This is the one regulatory tool which must be addressed in detail by the study.

Because the focus of the study is market dominance and not all issues of regulatory reform, Kearney has considered the other regulatory tools and the framework in which they are applied only in terms of an operating environment. The study assumes these regulatory tools will be applied in a manner consistent with the public interest objectives and the conceptual framework for a re-examination of the regulations previously discussed.

For example, this framework assumes that exit from a railroad market will not be restricted unless the Commission can assure the carrier adequate revenue through ratemaking procedures. This assumption raises questions about the validity of the practice of cross-subsidization whereby some shippers, in effect, must pay higher rates to permit otherwise uneconomical service to be provided. If cross-subsidization is included in the underlying assumptions, the entire approach to identifying and regulating market dominant traffic would be altered.

The study is also based on the regulatory objectives previously discussed. These objectives represent Kearney's interpretation of the fundamental basis of the Commission's approach to regulatory reform. This interpretation is based on discussions with Commission personnel, consideration of policy initiatives under way in the Commission, and recent major decisions. Other public interest objectives or substantially revised policy perspectives would probably result in very different procedural approaches. Such alternate public interest objectives have not been considered in this study.

THEORETICAL BASIS FOR MARKET DOMINANCE

The two dimensions of market segmentation presented in the conceptual framework (competitiveness and shipper bargaining power) suggest what issues will be of concern in a discussion of the theory of market dominance. If competition operates directly in the transport market, most (but not all) regulatory objectives are satisfied without the need for intervention. When a competitive transport market is not present, the shippers may still have the ability to protect their own interests, i.e., through their bargaining power. Where bargaining power is low or non-existent and competition absent, the shipper has no control over the rates (just as the individual shipper or carrier has no control over rates in a competitive market.) Figure III-1 shows the interactions of the shipper's and carrier's bargaining power and the resulting dominance conditions. However, the concept of market dominance is much more complex than a

Figure III-1

BARGAINING POWER APPROACH TO MARKET DOMINANCE

	RELATIVE BARGAINING POWER CONDITION		
CARRIER	STRONG Indicators· 1. No alternative carrier 2 Shipper's substantial investment	INTERMEDIATE	WEAK Indicators: 1. Shipper with alternative markets 2. Availability of alternative carriers 3. Substantial investment
SHIPPER	WEAK Indicators· 1 No alternative carrier 2. No alternative markets 3. No alternative production sites 4. Substantial investment	INTERMEDIATE	STRONG Indicators: 1. Carrier's substantial investment 2. Shipper's large traffic share 3. Multi-plant shippers 4. Alternative carriers
DOMINANCE CONDITION	MARKET DOMINANT	INDETERMINATE	NON-MARKET DOMINANT

determination of competitiveness and bargaining power, as difficult as those concepts are to define. A more comprehensive analysis is required, dealing with legal aspects, economic theory, and achievement of public policy objectives.

PROPOSED DEFINITION OF MARKET DOMINANCE

Section 202 (b) of the 4-R Act defines market dominance as the "absence of effective competition from other carriers or modes of transportation for the traffic or movement to which the rate applies." The legislative history indicates that the intention was to protect shippers against ratemaking abuses when competitive forces were not at work. The wording of the Act suggests a fairly narrow construction by its reference specifically to competition within the transport sector.

Because transport market competition is a sufficient condition (although not a necessary condition) for shipper protection, one major thrust of the market dominance analysis is to define effective competition. However, even this narrow construct of market dominance leads quickly to such questions as the relative bargaining strength of shippers and receivers, and total distribution costs versus freight rates, among others. Thus, for purposes of this study, the analysis has been broadened to a concept of market dominance which satisfies public interest objectives within the conceptual framework for reregulation. As a consequence, some of the concepts may lie outside the current legal definition of market dominance.

A more useful approach to market dominance suggests the following definition:

Market dominance is present in any rail segment when the following two conditions are fulfilled:

1. Where maximum rate regulation must be substituted for normal market forces to achieve the public objective of shipper protection;

2. Where the Commission can reasonably assure the railroad that the maximum rate set will furnish adequate revenue to provide and maintain the equipment and facilities necessary to operate the service.

This definition has several implications. First, the segments defined as "market dominant" must be isolated on the basis of the potential shipper injury and on the basis of natural forces protecting shippers such as available competition and bargaining power.

Second, the public policy objectives are addressed by linking the issue of adequate revenue to market dominance. When assets must be committed by the railroad for a specific service by regulatory order, i.e., market dominant traffic, then revenue must be assured on that service to provide an adequate return on the investment. If achievement of adequate revenue is impossible or highly uncertain at a rate which will move the traffic, then market dominance restrictions cannot be applied. Temporary imposition of market dominance restrictions may be necessary to allow shippers time to redeploy assets -- even if some shipper injury may ultimately result.

This view of market dominance calls for three areas of analysis:

1. The potential for shipper injury or abuse through railroad rate increase action.

2. The problem of determining adequate revenue in different traffic segments.

3. The need for a time phased approach to implementation.

Each of these is discussed in the following sections.

THEORETICAL ANALYSIS - SIMPLEST CASE OF "SHIPPER ABUSE"

Market power in economic terms is defined as the ability to charge substantially more than the cost of production without attracting competitors. This can be done through higher prices and discriminatory practices. Fairness and efficiency issues arise as the social welfare (in an economic sense) is not necessarily maximized under such conditions as it is in pure competition. It is of greater interest from a public policy viewpoint when the price can be raised above cost without attracting competitors until the user of transport services sees his return on

investment drop below the incremental cost of capital. In this case, probably the most unambiguous example of shipper abuse, the transport service user will discontinue new investments and will cease operation when existing capital assets are retired.

In summary, shipper abuse clearly occurs when the shipper's return on investment is lowered below the cost of capital by a rail rate increase which raises the rate above the cost of providing the service (total revenue including return on investment). Four conditions must be fulfilled:

1. The rail rate is above the total economic cost for providing the service.

2. At the rail rate, the shipper's return on investment is below the cost of capital.

3. If the rail rate were set at total economic cost, the shipper's return on investment would equal or exceed the cost of capital.

4. There is no other mode or carrier available to the shipper at a rate low enough to earn an adequate return on investment.

Assuming that a railroad is in business as an ongoing concern and has a technologically-based economic incentive to boost traffic volume, there is no incentive for a railroad management to raise rates for an individual shipper so far above the railroad's cost that the shipper must cease operation. In this simplest case of one shipper/one rate, at least in theory, carrier self-interest rather than regulatory intervention ought to be sufficient to prevent this extreme case of shipper abuse.

In reality, some rail carriers have fairly short planning horizons and might choose to raise the rate above the critical level for the customer as a short term expedient to enhance cash flow. The customer will not discontinue operations at once, unless the new freight rate actually creates a negative cash flow position. Thus, the carrier could enjoy the higher revenue for at least a while. The length of this time might range up to a period of many years if the customer's assets are relatively long lived and if the customer's management is convinced that future cost savings may once again make the facility profitable.

Also, it cannot be assumed that the railroad has perfect knowledge of the customer's markets, his costs and financial position, or the costs of providing the rail service. Simple error on the part of the carrier could lead the railroad to raise the rate above the customer's critical point inadvertently. At that point, adjustment of the rate to the long run maximum becomes a matter of negotiation between the parties. In the absence of regulation, the customer would have the options of:

- Providing his own transportation
- Encouraging other transport forms to enter the market
- Relocating his facilities closer to the market
- Ultimately discontinuing operations

Even where carrier's self-interest should protect the shipper, there is a risk of shipper injury when no competitively priced transportation alternatives exist. As will be seen from the more complex cases described below, there are many situations where the need for shipper protection may be even more significant.

THEORETICAL ANALYSIS - MORE COMPLEX CASES

The paragraphs below discuss several key problems relating to the difficulty in identifying the potential for or presence of shipper abuse. They are first discussed in general terms, followed by examples which illustrate several real world combinations of these problems.

(a) Rail User Earns a Rent

Many firms enjoy a return on investment substantially above their cost of capital. The amount by which earnings exceed the cost of capital is referred to as a "rent"[1] and may be attri-

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1 A commonly accepted definition of rent is: the excess of a resource's return in the best use over its possible return in other uses. (George Stigler, The Theory of Price, New York: The McMillian Company, 1952, p. 99).

butable to some market power in the users commodity market; to a locational advantage relative to other producers; to artificially low rail rates brought about through regulation; or to other advantages enjoyed by the shipper. Rent occurs in both competitive and non-competitive market environments. Whatever the source of the rent, it may be within a carrier's power to capture some of this rent for himself (just as government, labor, and other suppliers attempt to do so through taxes, union negotiations and price increases). It is not clear when shifting of such rent becomes shipper abuse, except where a user's rent and his "normal" profit are eliminated by a freight rate increase. When the railroad shifts rent to itself, there is always the potential of attracting other transport firms into the market; however, this shift in rent raises serious short run equity problems and may call for steps to protect shippers. Certainly, no such shift in rent can occur if this rail market is freely competitive.

(b) The Rail Rate Increase is Passed Fully to Consumers

If the characteristics of the shipper's output market are such that the full cost of the rate increase is borne by consumers of the shipper's output, then no shipper abuse can occur. The market characteristics required for full cost pass through with prices reflecting the cost increases and no reduction in purchases are stringent; in particular, output demand must be completely inelastic. In more realistic cases, where a demand curve of elasticity greater than zero but less than infinity is faced by shippers, only partial pass-through is possible and the shipper will bear part of the adjustment. To the extent this occurs, it is possible again to speak of "shipper abuse".

(c) Alternative Means of Transport May Be Available - But at Higher Cost

In the simple case it was assumed that the user had no alternative but to use the railroad or go out of business. More typically, however, there is some transport alternative. Often, the alternative requires a higher price, although the total transport cost may be close to that of existing rail service. If the rail

rate is raised to a point close to the truck rate, for example, relative service differentials may yield the same total transport cost. If the service differential is absent, the shipper experiences an increase in transport cost. It is possible that the cost increase may constitute a case of abuse just as certainly as if there were no alternatives at all.

(d) Users Include Both Shippers and Receivers

Freight charges are usually paid for in their entirety either by shipper or receiver, rarely by both equally. The decision as to who pays is ultimately decided by their relative bargaining strength -- usually a function of alternatives for both buyers and sellers. Given a substantial rate increase, the party who pays the transportation cost must make a decision regarding his market position. Without a change in his bargaining power, he cannot shift the transport cost to the other party. If the shipper pays and the goods are destined for a competitive receiving market (as with construction aggregates destined for a major metropolitan center), he must absorb the increase or withdraw from the market. Similarly, the receiver who pays must either absorb a higher cost or find an alternate source.

Depending on which party absorbs a rate increase, the shippers' susceptibility to abuse is greater than receivers. The shipper is faced with the very narrow choice of the simple case discussed earlier: take the higher freight rate or cease doing business (or at least leave the market). The receiver on the other hand may have possibilities for commodity substitution and alternate sources. Moreover, the increased costs to the receiver constitutes an increase in cost of only one factor of production, thereby producing a proportionately smaller impact on the receiver's profit than when the shipper absorbs the increase (which constitutes a direct reduction in revenue and profits). While it is true that allocative effects are the same in either case, the distinction is important for predicting high risk areas for long run shipper abuse for procedural design considerations.

(e) Network Effects Complicate the Analysis

The relationship between railroads and their customers is defined by a relatively inflexible network of routes and the geographic characteristics of the route. In this regard, they are similar to water carriers (though not identical since any water carrier firm may operate anywhere on the inland waterway system whereas railroads own exclusive routes). Conversely, rail carriers are very different from most motor carriers (even

the route authority granted regular route common carriers is a regulatory creation which has less and less significance as time passes). In analyzing the possible ways in which rate increases may injure shippers, a number of geographic distribution pattern considerations must be examined.

One example is that of the large shipper whose operations are geographically widespread and whose shipments move in competitive as well as noncompetitive transport markets. Such a shipper may have the capability of defending himself against rate increase abuses in noncompetitive markets by tying low rates in those markets to his selection of carriers in competitive markets. Such behavior is one example of shipper bargaining power which is discussed in more detail later.

The reverse situation is that of the very large rail carrier which provided all the rail transport from all directions into one consuming area. In such an area, a competitive market for some rail-transported commodity may exist; however, unless there were truck served sources of supply, the commodity price would simply rise to cover freight rate increases imposed by the railroad. The only requirement would be that the railroad raise the rate on all inbound movements of the commodity by the same amount simultaneously.

(f) Not All Users May Be Equally Vulnerable to Abuse

The simple case of "one rate/one shipper" is fairly rare in the rail industry. Usually, single rates apply to groups of shippers and/or large geographic areas. In these instances, the four conditions required for abuse may not be present for every shipper when a rate is raised. It is true that shipper abuse might be avoided if the carrier broke up the single blanket rate into numerous different rates for different shippers. This would be legally non-descriminatory if each shipper's transportation circumstances were really different. For many practical reasons (such as a large number of shippers in one small area), it may not be possible to develop a more finely divided rate structure. If it is not, then the least efficient shipper/producer is the most vulnerable to abuse.

Moreover, the railroad may have an incentive to raise such a rate (even if marginal producers are forced out of the market) if the revenue increase from the remaining traffic more than offsets the reduction caused by the loss of customers. In the later case, not only is a shipper protection question raised,

but economic efficiency is diminished. Economic efficiency criteria suggest the carrier be required to develop a modified rate structure which could permit all producers to stay in the market, while still providing adequate revenue to the railroad. The six problems described above can be illustrated by the simple market presented in Figure III-2.

In Figure III-2, M represents the market where the commodity produced by shippers S_1 through S_{12} sell their products. Two source regions supply the market and are served by different railroads A and B. Source S_{12} sends its production by motor carrier. The sources are assumed to be far enough apart that the cost of rail service to each is significantly different. Countless rail markets work this way. Examples include grain moving from various producing regions into Kansas City or Minneapolis, coal from Appalacnian Region mines to consuming areas in the Midwest and East, and lumber and plywood from the Pacific Northwest and Southeast moving toward Midwestern and Eastern markets, to name a few.

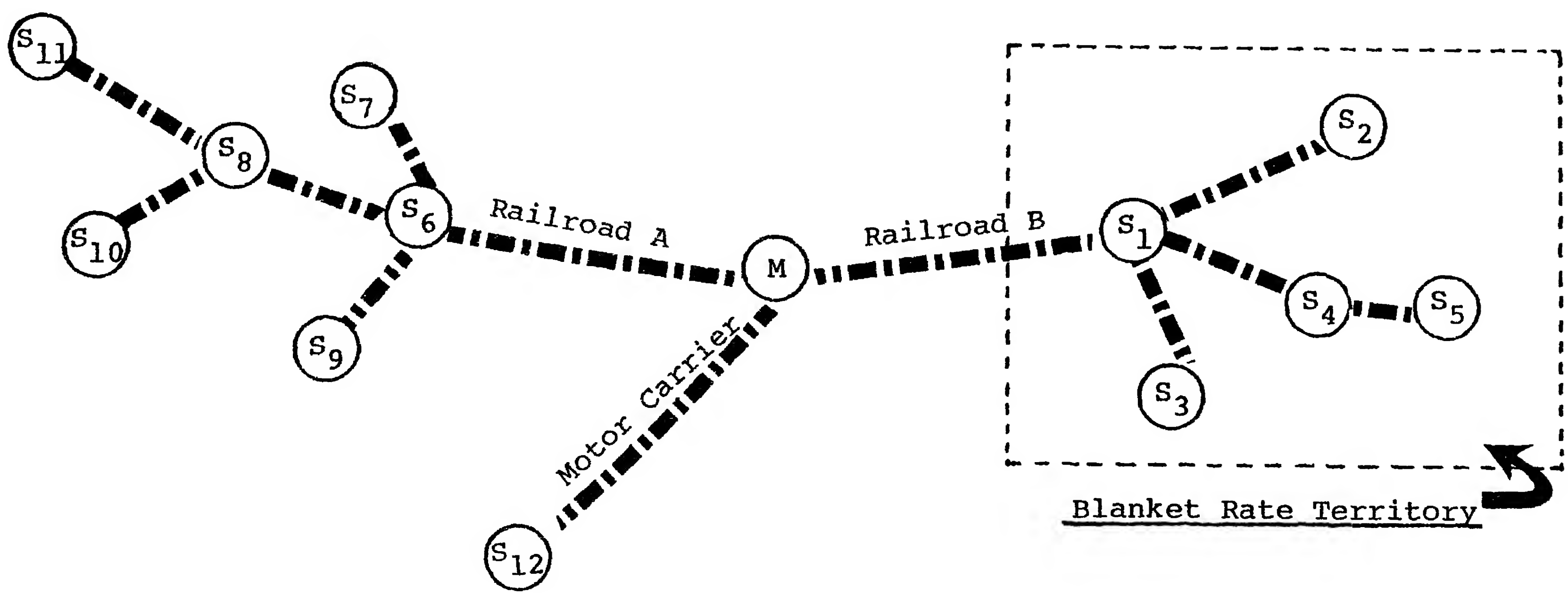
In all these examples, the market (at M) is competitive. If producers wish to sell in the market, they must do so at the market price; freight rate changes must be absorbed by the shipper. Now if shippers S_1 through S_5 are in a blanket rate region and pay the same rate, but shippers S_6 through S_{11} each pay a different cost-based rate, then a "rent" is being earned by some of the shippers covered by the blanket rate. In other words, shipper S_5 earns more than he would with cost based rates, and his company's worth is thereby greater. (This would be true also of timber land, farm lands or mines.) If the blanket rate on Railroad B is lower than any of Railroad A's rates to its shippers, Railroad B's shippers all realize a larger income from sales in market (M) and thereby enjoy a "rent" in comparison to shippers served by Railroad A, assuming the production costs of all shippers are similar

Several carrier actions are possible here, each with different consequences for shippers and different possibilities for shipper injury or abuse:

1. Railroad B raises its blanket rate to the average level of Railroad A's rates. By doing so, Railroad B captures the rent for itself which its shippers previously enjoyed. Assuming shippers S_1 through S_5 have equal costs, all will stay in business, however, their income and the value of their businesses will fall.

Figure III-2

Illustration of Shipper Abuse
Definition Problems



2. Railroad B raises the blanket rate still further. While S_1 through S_5 have similar costs, the costs are not identical. (Farming techniques, and weather conditions vary, coal seams differ in depth and thickness, manufacturing processes differ, etc.) With the new higher rates, S_5, for example, may be unable to produce profitably. If the other shippers can still produce, Railroad B may realize a net increase in revenue even though S_5 goes out of business.

3. Railroad B breaks up the blanket rate territory. Now Railroad B can introduce cost based rate-making and can raise each shipper's rate to capture the rent of each. S_2, S_3, and S_4 lose the rent associated with a blanket rate and will either gain or lose income depending on the carrier's individual rates for each. The value of their firms will rise or fall accordingly.

4. Railroad A and B merge and raise all rates. So long as competitive producers served by other carriers are selling in the market, neither set of producers could raise prices nor pass freight rate increases along to receivers. Now, however, unless S_{12} has very large capacity and can influence market prices (which he could not previously do), a single rate increase will be passed directly to the buyers. This, of course, is the reason why blanket rail rate increases tend to be more palatable to shippers and thus favored by the carriers.

This example can be used to illustrate several other points discussed above. In particular, buyers at M are protected by commodity competition against rail rate increases, but shippers are not. Only if transportation alternatives (barge, motor carrier or competitive railroad) are available to shippers are they securely protected against rail rate increase abuse. Another point is the ability of shippers to defend themselves through "bargaining power." If the same company owns S_1, S_2, S_3, S_6, S_7, and S_8 and Railroad A raises the rate, the owner of these source points may temporarily divert production (including possibly labor and machinery) to points S_6, S_7 and S_8 in retaliation. If this diversion reduces Railroad A's revenue more than the increased revenue from S_4 and S_5, Railroad A will be forced to recind its rate increase.

Figure III-2 also illustrates another case of rail traffic flow where M is the point of origin and the S points are receivers. If producers at M are competitive, they will utlimately be forced to let the buyers pay freight as the price falls toward the production cost. If either railroad raises rates,

producers will be unaffected by the rate increase whereas receivers will be expected to absorb this as a cost. This case is representative of the steel traffic originating in the producing region around Pittsburgh. Here the likelihood for injury to the buyers is directly proportional to the proportion of inbound freight cost relative to total production cost.

CONCLUSIONS FROM THEORETICAL REVIEW

From the previous discussion, several general conclusions can be drawn concerning how market dominance must be defined to accomplish the regulatory objective of shipper protection. These are summarized briefly below:

1. In rail traffic segments where each shipper is charged a different rate, a railroad would not normally raise its rates above its total economic costs to the point where a shipper is forced out of business. Error, misunderstanding of shipper circumstances, short term needs by the railroad for cash, and the difficulty of railroad cost finding may result in shipper abuse in the absence of competitively priced transport alternatives.

2. Commodity competition will not always restrain rail rates. Shippers serving competitive commodity markets will be forced to absorb rail rate increases, use alternative transportation or leave the market.

3. Rate increases which transfer a portion of a producer's rents to the railroad cannot automatically be considered abusive. However, they do raise fairness and equity issues. Such a transfer is impossible in a competitive transport market and probably ought to be considered the product of a railroad market power and indicative of "market dominance."

4. A shipper's bargaining power resulting from size, geographic spread and the attractiveness of his freight to the railroad (especially high value, dense commodities), appears to be the only substantive shipper protection in the absence of a competitive transport market.

5. A competitive transportation market does provide protection for rail users against abusive rate increases. However, if the competition is potential (in the sense of an as-yet-unused alternative), neither shippers nor railroads may know in the short run whether it is a viable alternative without a systematic assessment of total distribution costs.

(a) Market Dominance
and Adequate Reveune

The link proposed between market dominance and adequate revenues has problems which also complicate the application of the market dominance concept. Two of these are discussed below.

1. Rail costing is an inexact science. By the preceding definition, a rate is only abusive if it is above the railroad's total economic cost for providing the service. In economic terms, this is the marginal cost; however, marginal cost is widely felt to be undefinable for a railroad, given the problems of jointly-used facilities and the nature of train operations. The Commission has developed Rail Form A costs in an effort to provide a common base for rate-making decisions. Unfortunately, the retrospective nature of Rail Form A costs (i.e., their basis in the accounting data from the preceding year), does not necessarily provide a guide to rates which will be effective in the future and which will have to pay for future investments.

Moreover, Rail Form A costs are based on either regional or carrier averages and do not reflect specific movement costs without considerable adjustment. This adjustment requires costly data gathering and analysis. Other problems relate to the inability of either Rail Form A costs or any commonly used costing approach to identify costs associated with peak and seasonal demand conditions. Rail Form A is currently undergoing substantial refinement and elaboration. No such improvement, however, will fully eliminate the inherent problems in allocating fixed costs to various system users.

2. Assuring adequate revenue implies forecasting demand. Since both revenue and unit costs are a function of volume, setting a maximum rate to insure adequate revenue requires a demand forecast. For many rail commodities, forecasting simply involves a forecast of overall economic activity, since the demand has displayed highly stable and predictable characteristics. This may even be true of certain seasonal commodities, particularly iron ore and construction aggregates which were shown in the Commission's report on seasonal rates to be influenced by winter conditions.

In other instances, a forecast of demand may be extremely difficult. Some grains, for example, are storable. For these, fluctuations in rail demand are influenced both by traditional seasonality and by sometimes unpredictable fluctuations in world market prices. An even more difficult case is that of producers

whose ability to absorb a rate increase is uncertain. If the railroad's costs call for a rate very close to shipper's threshold for withdrawing from a market or for reducing output, predicting demand over the economic life of the railroad's assets may be impossible.

Finally, perhaps the worst case, some producers, such as many small coal mine operators, only produce when market prices are high enough to justify operation. While these shippers may have no transport alternatives and are extremely vulnerable to rate increase abuse, their demand for rail service may be so unpredictable as to make adequate revenue meaningless, particularly if they are served by branch lines which serve no other shippers.

The proper approach to this problem area may be that where adequate revenue cannot be achieved by Commission-set maximum rates, but the lack of competition test is met, common carrier obligation would not be imposed on the railroad but a maximum rate would be set at a level to move some traffic. The railroad might chose to maintain a fleet of old cars for this traffic; however, as these cars become unservicable, the carrier would have no obligation to provide service. In this case of "noncompensatory" market dominant traffic, the only alternative consistent with the adequate revenue objective would be complete deregulation of the traffic or at least a finding of non-market dominance.

(b) Time Phasing
Market Dominance

The discussion of the ability of railroads to impact producers and the value of producer's property suggests that even where noncompensatory rates are proven, the movement of rates toward compensatory levels (adequate revenue) should be cushioned. The shipper's investments were predicated on a set of rate relationships which were stabilized by the government. That stability was imposed in part to make those investments possible. Equity considerations dictate that rate relationships be allowed to change slowly enough so as to permit shippers to respond by redeploying assets.

(c) Implications for the Analysis

The foregoing discussion supports the initial proposition that the market ought to be segmented into various degrees of competitiveness and levels of shipper bargaining power. It also lays out some fundamental concepts of where the risk of shipper abuse is high. It emphasizes the important role of shipper bargaining power (as derived from size, geographic circumstances and commodity characteristics) as the only effective substitute for direct competition within the transport sector. The crucial role of adequate revenue in market dominance determination was highlighted along with the cost finding and revenue forecasting problems associated with this issue. Lastly, the need for protection of shippers through time-phased increases of rates to compensatory levels was stressed.

For the immediate purpose, the above analysis indicates a need to develop clear measures of the presence of transportation market competition of the presence or absence of shipper bargaining power and of the ability of the Commission to assure adequate revenue on otherwise market dominant traffic. Theoretical issues related to developing these measures are presented in the next section. The relationship between adequate revenue and time phased implementation of market dominance will [illegible] procedural design and will be discussed further in Chapter 7.

THEORETICAL ISSUES IN MARKET SEGMENTATION

The only theoretically rigorous and precise approach to determining the presence of direct competition would be to perform a complete analysis of total distribution costs for the producer in question. The change in costs associated with a switch to alternative modes or carriers would have to be tested against the shipper's profitability and the new return on investment compared against his cost of capital. This approach, while feasible for the individual shipper is clearly impractical when thousands of shippers and [illegible] of movements are involved. Moreover, such a determination depends upon a large number of cost estimations which are based on shipper-supplied data of doubtful availability even at the individual shipper level. Consequently, some theoretically reasonable and practical approach to finding the presence or absence of competition must be found, not only for this study, but for future regulatory procedure implementation.

Similarly, shipper bargaining power, although easily understood as a concept, is exceedingly difficult to measure and identify. Alternatives for identifying the presence (and possibly the degree) of shipper bargaining power must be explored through appropriate methodologies.

In this section, several alternatives are considered for dealing with these segmentation problems.

(a) Market Share Measurement

Numerous theoretical approaches to the search for effective competition have been considered during the course of this project. One of the first was measurement of rail market share. In anti-trust law, a company is generally considered to have domination of a market if it has a two-thirds market share or more. While there is no particular theoretical justification for the selection of two-thirds (as opposed to seven-ninths or some other value), it does carry the weight of legal precedent. The ICC drew on this precedent in its rebuttable presumptions for market dominance by establishing a 70 percent market share test.

Unfortunately, the measurement of market share has proven unsuitable as a determinant of the presence of effective competition for several reasons. First, as demonstrated in the ICC report on Section 202 prepared by Kearney in 1977, market share is, in part, a function of the size of the market. Rail market shares tend to be significantly lower when large geographic market aggregations are considered rather than small ones. Typically, for a given commodity moving on a given route, the entire traffic will move via one mode. This simply indicates at that moment the mode is lowest in total cost; nothing is indicated about how close or how far away the cost for using an alternate mode might be.

In economic theory, a market is defined as a set of products whose mutual cross-elasticities of demand and supply are high. A market, then, consists of all of the goods which compete with each other and which are regarded by most customers as mutual substitutes or complements. While this is intuitively reasonable, no theoretically correct threshold value for cross-elasticity has been developed as the criteria for market determination.

Of course, if it were possible to measure cross-elasticiy easily the first measurement of high "cross-elasticity" found would indicate the presence of competition and make a search for the ultimate boundaries of the market unnecessary. This results in a circularity which essentially negates the value of this type of theoretical approach to market definition.

Whatever the procedure developed for defining "the market," the history of anti-trust enforcement provides ample evidence that market definition can become a prolific source of litigation and dispute. If the regulatory procedure for finding the presence of effective competition required first, a procedure for market definition and second, a procedure for market share estimation, the time and cost of filing, protesting and defending rate actions would be increased many fold. The result of this major increase in procedural cost would be to impede rail ratemaking flexibility while accomplishing little in terms of more efficient protection of shipper interests.

Even if it were possible to develop a practical methodology for market definition and a market share test proved valid as a test for competition, there is a serious procedural flaw in this approach. Once a market was defined and a decision made as to market dominance, the market is presumed to remain unchanged until the Commission specifically finds otherwise. Thus, it would be possible for a finding of market dominance under this approach to apply to shippers and carriers who were never given an opportunity to present evidence in the case. Were they subsequently to bring convincing evidence of the inaccuracy of the market definition, the entire market definition procedure would have to be repeated.

For reasons such as these, the study has shifted from a search for competition through market definition to an effort to identify the presence of competition directly.

(b) Direct Measures of Competitiveness

The existence of effective competition on any segment of traffic is a result of more than differentials in transportation costs. The degree of competition is a result of numerous factors in the shipper's modal choices. In principle, these factors influence the demand and supply of freight transportation

and precipitate the final modal choice. The factors can be generally classified into four groups, those determining:

1. Direct Transportation Cost

2. Service Differentials

3. Commodity Characteristics

4. Shipper's Characteristics

Data constraints and measurement problems will not allow all these factors to be fully incorporated into an operational model analysing market competitiveness. But it is important to recognize the conceptual goals and direct its construction toward them. This section considers these modal-split factors in order to obtain a theoretical background to support the development of subsequent empirical analysis. Each is discussed below:

1. Direct Transportation Cost. Although the freight rate comprises the greatest proportion of this cost to the shipper, for railroad transport [illegible] there are other significant costs (such as loading, [illegible] transit diversion and unloading) which the shipper may have to consider. In comparing intermodal cost [illegible] these rail cost components have to be summed [illegible] comparability. Whether or not this can be achieved depends on data availability. Nevertheless the direct transportation [illegible] price component over which the carrier [illegible] Thus it is the most effective short-[illegible] promoting his comparative advantage. In [illegible] the freight rate should reflect the value of service differentials to the shippers This is obviously [illegible] rates are regulated.

2. Service Differentials. It has been argued in transportation literature that if railroad and motor carriers had the same freight rates truck would still be chosen over the railroad due to superior services, such as shorter transit time, greater reliability, less likelihood of loss and damage, and greater service frequency. The fact that shippers, stressing these needs, would pay a higher rate for them implies the monetary loss caused by the lack of such services is significant. On the aggregate level, whether or not these factors have been responsible for the rail market share decline or not is an important question for several reasons.

For the immediate purpose of identifying market dominance, substantial service differentials mean the cost differential approach has to be supplemented by some quantification of the monetary value of these services. The difficulty of such a task is well known. However, not all commodities are sensitive to these services. Low value and bulk commodities are usually regarded as less sensitive to service differentials. Essentially, the desirability of the services depends on the commodity characteristics. This suggests that, in order to acquire realistic intermodal cost differentials, the commodity groups must be analyzed by their commodity characteristics and be correlated with the service differentials of the various modes.

An element of this analysis is directed to comparing direct transportation costs of alternate modes and estimating the relative importance of service factors using commodity value as a proxy measure of service sensitivity. This analysis will constitute one approach to market segmentation.

3. Commodity Characteristics. From the previous discussion on service differentials, it is obvious that the characteristics of the commodities to be shipped, to a large degree, determine the dominant mode. It is easy to recognize the relevant physical characteristics, such as bulkiness, value, density, special handling, and fragility to identify the relative modal advantages. There are, however, some characteristics not easily recognizable because they are imbedded in the distribution system of the commodity. Variance of consumption pattern is a good example to illustrate the importance of transit frequency. A large variance and high inventory cost compel the shipper to depend on trucks whose delivery schedule is more flexible and frequent. Depending on the receivor's distribution level, one mode can be preferred over the other. If the commodity is for final consumption instead of for intermediate consumption, the door-to-door delivery of the trucks has a positive service differential over the railroads. The requirement for transit time reliability can be an important element of demand for some commodities, such as the ones to be directly exported. Generally, each commodity has one dimension of service to which it is particularly sensitive. In the process of determining whether the transportation of the commodity is railroad dominated or not, the identification of these service differentials can be crucial.

4. Shipper Characteristics. The shipper's characteristics form an important consideration since the demand for freight transportation is a derived demand from the shipper's

economic function. The competitive posture of the shipper in his product market cannot be ignored if the analysis includes potential modal competition. Furthermore, the relationship between the competitiveness of the carriers and shippers is crucial since one can influence the other significantly. The well-being of the railroads which transport automotive products is inevitably tied to the automotive producer's operations. A monopsonistic shipper facing a number of railroads can exercise considerable power over the carriers. This is another way of approaching the question of shipper bargaining power.

The above four factors form a useful background for the discussion of carriers' competitiveness. Not all of them can be incorporated in an analytical framework. Nevertheless, their explicit recognition promotes not only an operational but also an economically sound analysis.

(c) Other Measures of Competitiveness

Several other measures have been considered, with varying degrees of validity for this study and for adaptation to regulatory procedure. They include:

1. Market Barrier Tests. Examining the level of entry barrier is a customary step for economists in measuring market power. This is done on the assumption that there is some artificial arrangement obstructing other entrepreneurs from entering into the same business. The concept has not gained consensus among economists and is weak in determining how the existing supplier intentionally sets up the barriers. There are cases where the barriers are inherent in the production technology, such as large investment outlay and low capital turnover. The railroads have been a prime example of such natural monopoly and thus subjected to extensive government intervention. Yet such regulations supported by government are often themselves the sources of entry barriers.

The comparison of such barriers to those erected by would-be monopolists is not appropriate since, in the case of the railroad industry, the institutional barriers not only prevent entry but also exit. It is meaningless to measure market competitiveness by examining an entry barrier which is exogenously imposed and not a part of the optimizing behavior of the existing supplier.

2. Profitability Analysis. The theory of market competition states that unless there are market entry barriers, extra-normal profit cannot be sustained continuously in any industry. A normal profit rate should reflect (besides the cost of production) risk, inflation expectation, and other investment requirements. Anything above this "normal" profit signifies the supplier's ability to prevent other equally efficient suppliers from entering the business. The railroad industry, taken as a whole, certainly does not display market power based on its profitability. Nevertheless, one cannot determine the potential profit position of the railroad industry if it were to be relieved of rate and market entry regulation. Thus, regulation conceals the true competitiveness of the railroads and may result in lower rates of return than their market position would otherwise make possible.

Individual segments of rail traffic may be exceptionally profitable and thereby indicate the presence of market power as the theory suggests. Some traffic, such as automotive products and certain coal movements, displayed distinctly above average revenue cost relationships in the Commission Burden Study for 1975. However, cost/rate comparison must be handled with care since refined rail costing is extremely difficult to achieve and cost calculations will vary depending on the allocation basis for fixed and overhead costs. Despite these problems, the presence of a high revenue/cost ratio based on Rail Form A costs may be a necessary (but not sufficient) condition for the absence of competitiveness to be determined.

3. Elasticity Measures. Quantity changes due to price changes have always been considered by economists to be an important measurement of competitiveness. The percentage change in the quantity consumed reflects the dependence of the consumer on the supplier. The concept of the cross-elasticity -- the percentage change in the demand for a good due to a percent change in another good's price -- is a classic tool for identifying the degree of cross substitution among goods.[2] Anti-trust cases have traditionally relied on the empirically measured cross elasticity of the goods in question; high cross-elasticity implied the goods are in the same market. But one should note, as mentioned previously, there is no theoretical basis for determining how "high" a cross-elasticity has to be before a market is defined.

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2 Cross-elasticity of ith good with respect to the price of gth good is defined as: $\frac{\%\ \text{change}\ Q_i}{\%\ \text{change}\ P_g}$

The use of elasticity measures is greatly hampered by data requirements and estimation procedures. The time-series data required for statistical analyses are not always available for many goods and services. Structural changes in the market during the sample period also may invalidate the resulting analysis. Furthermore, current econometric analysis is based on many rigid assumptions and its results are often sensitive to any change in the method and the specification of the estimation procedure.

The relationship between the elasticity measurements and the concept of market dominance needs amplification. Elasticity can be measured on many levels. One level is the elasticity of demand for transportation of commodities taken as a whole, i.e., corn, coal, primary steel products. Such elasticities are usually very low. Assuming the elasticity of substitution between transportation and all other inputs is zero, transport demand elasticity is equal to the product of the commodity elasticity times the freight rate ratio (transportation cost divided by the total delivered price of the goods). Measurements of this level of elasticity do not indicate the market power of individual carriers handling the commodity. Before concluding that a transportation market is non-competitive, the cross-elasticity of demand must be determined. The cost of estimating carrier cross-elasticity for finding market dominance is prohibitive.

In preparing the Report to Congress on Section 202 of the 4-R Act, Kearney performed an analysis of the current literature on elasticity and transportation cross-elasticity between modes. While values for commodity elasticity and total transport demand elasticity were estimated, very few values for railroad demand elasticity were found. Estimates were developed, but their most striking feature was their great dispersion. In no case were elasticities found for individual carriers.

Attempts by railroad marketing departments to compute elasticity of demand for their own traffic have usually ended in frustration. For many commodities the current quantity demanded is a function of many variables in addition to current rail rates. Some of these variables are internal to a few major shippers and cannot be readily identified (and certainly not quantified) by the railroad. Thus, it has been concluded that despite the theoretical attractiveness of elasticity measures as a test of market competitiveness, they cannot be employed as a working tool for this analysis.

4. Demand Instability. Faced with forms of demand instability, rail carriers have to incorporate the uncertainty

into the rates they charge to compensate for the danger of not being able to recover the sunken cost on the new services. This can be accomplished through seasonal pricing and contract rates which, if unregulated, are set according to the level of the instability. Shippers refusing to pay such rates will find the rail carriers unwilling to provide the service, since a lower rate, in effect, is noncompensatory.

The underlying reason for using demand instability analysis is the recognition that rate regulation of the traffic facing fluctuating and unpredictable demand may be inconsistent with the purpose of the 4-R Act. It is true there are industries where the government regulates and insures a proper return on the capital invested in the industry, such as utilities. This is because the industry is a true natural monopoly and the demand for electricity in an area is not only inelastic but also "captive" since there is only one producer.[3] In certain environments, a utility commission can impose on the producer the responsibility of supplying many customers while still permitting adequate revenue. Recent structural changes in the rail industry have introduced many elements of uncertainty and competition so that a regulatory agency faces many difficulties in identifying a rate which will assure a proper return on the investment, particularly in the areas of unstable demand.

The private market, on the other hand, can price this uncertainty. This can be achieved most efficiently by private negotiation where exchange of information improves the predictability of the fluctuation. The remaining risk is then shared between the shipper and the carrier. Government intervention, in contrast, requires the regulatory agent to be cognizant of the numerous factors determining the supply and demand for the service. The impracticality of such a task leads one to conclude that this traffic should potentially be unregulated.

5. <u>Market Share Shift</u>. In its simplest terms, one aspect of market dominance is the ability to hold a substantial share of the market. It is not only essential to acquire a large share but also to maintain this position. Market share analysis requires dynamic elements. Examining the shift in a

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3 In the long-run, there are still alternatives for the users such as switching to other types of energy, providing their own energy source, or moving elsewhere.

carrier's share of the traffic through time may reveal the increase or decrease in its level of market power. If the carrier's market share is decreasing, it is likely there is competition. On the other hand, a stable or increasing market share may imply possible market dominance.

The problems associated with market definition are less significant here than with threshold tests of market share. What is of interest is the trend over time, not the absolute values. To be sure, a shift from 90 percent market share to 85 percent market share over five years may not be significant, i.e., the rate of change may imply structural changes in the industry or geographic relationships rather than the presence of competition. Nonetheless, major shifts in market share, when combined with other measures (as discussed below) may be useful in highlighting probable areas for the presence of competition. Conversely, great stability of market share over time, particu larly at high levels, may be a strong indicator of the absence of effective competition.

In the following chapter, a measure of market share shift which constitutes one empirical test for the presence of competitive forces is described.

6. Combination of Measures. There is no reason to believe that any one measure can be the single tool to identify transport market competition. For example, a cost/revenue ratio test may be combined with a market share shift test or a rate competitiveness test applied jointly with the cost test. As the actual empirical tests have been applied and tested in combination, our understanding of their interrelationships has increased.

(e) Bargaining Power Measures

Up to this point, the alternative measures have focused on the market power on the side of the carriers; the noncompetitiveness of the carrier has been measured by the absence of competing carrier or modes. The approach is only concerned with the shipper's ability to find a substitute for the supplier of transport service. This is based on the assumption that the shipper has no market power. But, actually, there are many instances where the shipper possesses market power and employs it to bargin for a favorable rate or contract.

In this light, one can see that the strict interpretation of market dominance--carrier's market power--is incomplete and misleading, when the shipper has some degree of bargaining power. The concept of bargaining power expresses the "relative" market power between the carrier and shipper and is applicable on a more general level than a concept considering only the carrier's market power. The following cases illustrate the existence of bargaining power on the shipper's side.

1. Multi-plant Capability. In this instance, the shipper operates many plants producing essentially the same goods. A rate increase by a carrier serving one plant can be counteracted by shifting production to another facility. Alternatively, if another plant is served by several railroads or economically viable motor carrier service, the shipper may threaten retaliation in the competitive market in response to the rate increase in the market dominant market. Where railroads compete intensely for the traffic of large, multi-plant firms, they often display mutually injurious price cutting behavior. In fact, it seems likely that, at some point, railroads must be protected from each other and from powerful shippers by a more positive form of minimum rate regulation. This illustrates a case where some regulatory intervention may be required to preserve adequate revenues even in non-market dominant traffic segments.

2. Inbound-outbound Tie-ins. Typically, the output of any producer has a higher value and will tend to carry a higher freight rate than inbound raw materials. When both inbound and outbound movements are suitable for rail transport, the producer may agree to ship outbound by rail only if inbound rates are held to a low level.

There are many examples of this type of shipper power. Perhaps the most widespread is the use of in-transit rates. Here explicit tie-ins are made a part of the tariff. The impact of these tie-in arrangements is enormous, and any attempt to weaken them by minimum or maximum rate regulation must be carefully analyzed. (For example, a recent study of the economic position of Kansas City as a riverport predicted that maintaining Kansas City as a in-transit point for rail movement of grain was more important to the city's economic well being that any further development of Missouri River port facilities.) Other tie-ins occur between such commodities as: pulpwood logs and paper products, and sugar beets and refined sugar.

3. Attractive Commodities. Some commodities are inherently attractive to railroads -- primarily dense, medium to high valued products such as canned goods. Where shippers offer

such commodities, they have a negotiating tool, especially if coupled with an inbound-outbound move.

4. Significant Railroad Investment. Carrier investment in specialized cars may give a shipper some competitive advantage, particularly if there is no ready market for the cars. Unlike many shippers, the railroads generally purchase cars through issuance of equipment trust certificates, a form of mortgage. If a shipper's traffic is withdrawn, the carrier may find himself with a fleet of under-utilized cars and a substantial fixed charge in equipment mortgage payments. From this perspective, the potential injury to a carrier with substantial investment in cars is at least equal to a shipper with substantial investment in transport-related facilities.

5. Shipper routing control. Even where a shipper is served at his plant by a single carrier, the ability to short haul the originating carrier can be employed as a bargaining tools. This is especially true where there is a disadvantageous division arrangement for the originating carrier when the interline option is employed instead of a single line haul.

There is evidence that, in some cases, shippers and carriers are mutually satisfied with their respective bargaining positions and enter into incentive rate arrangements and other negotiated rates. With the legalization of contract rates, shippers and carriers may evaluate their bargaining position and increasingly turn to negotiation rather than regulation for rate setting.

SUMMARY

In this chapter, Kearney defined a theoretical basis for the analysis of market dominance. The definition of this crucial term in the regulatory scheme should further the regulatory goals of allocative efficiency, shipper protection, and revenue adequacy. The basis for regulation is thus to ensure that railroads engage in neither shipper abuse nor are abused.

Shipper abuse is the principle issue that triggers market dominance concern, since shipper abuse occurs only in the presence of market power. In certain extreme cases, shipper abuse may be defined in relatively simple terms that focus on the shipper's return on investment. However, the general case of shipper abuse is far more complex, and the analysis leads to two

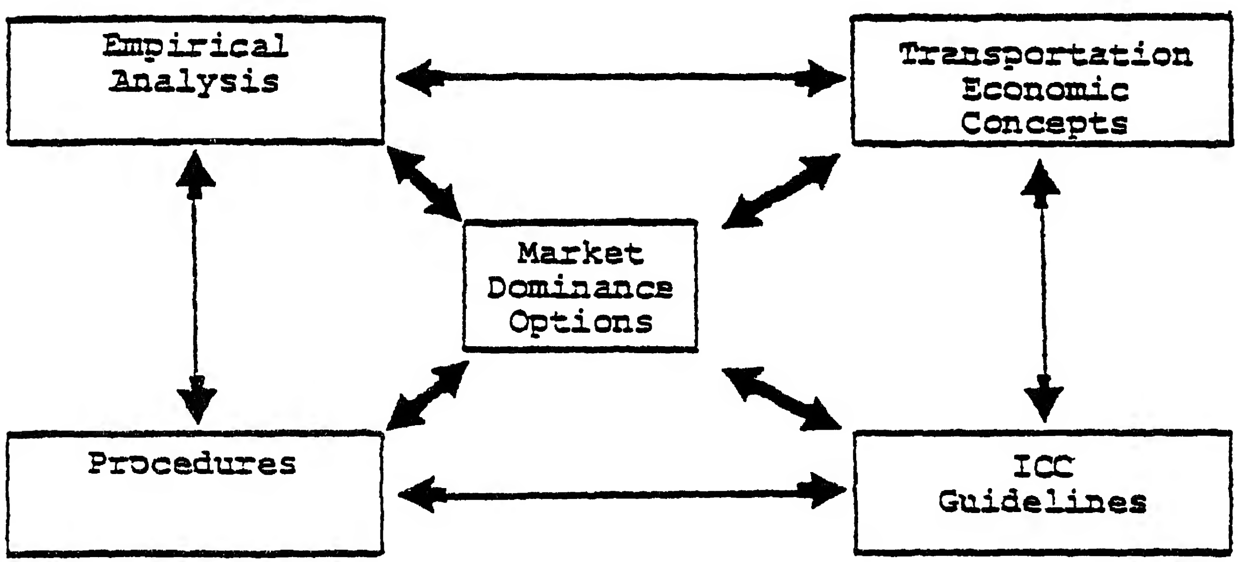
further concepts: effective competition and shipper bargaining power. The possibilities for shipper abuse are defined in terms of the presence of these two constraints. The issues surrounding these concepts and various difficulties in their application are discussed in the text.

IV - RESEARCH DESIGN

A - BASIC RESEARCH STRATEGY

This chapter provides a detailed description of the research methodology employed in this study. The chapter is divided into three sections, Basic Research Strategy, Conceptual Framework of the Research Design, and Empirical Analysis.

A thorough understanding of market dominance requires the synthesis of a number of research approaches into a multidisciplinary analysis. In the study, the market dominance guide lines are being developed through relating the research results obtained from the procedural analysis, empirical analysis, ICC guidelines and transportation economic concepts in an interactive way as shown below:



The first three chapters of this report focus on transportation economic theory, public policy objectives and procedural questions. In the remainder of this report, emphasis is placed on the interaction between the empirical analysis and procedural design.

B - CONCEPTUAL FRAMEWORK OF THE RESEARCH DESIGN

EMPIRICAL ANALYSIS

The empirical analysis consists of a two phased examination of the market for rail transportation. In the first phase, the 1977 One Percent Rail Waybill Sample augmented with data from the 1967 and 1972 Commodity Transportation Surveys and the 1967 and 1976 Quarterly Commodity Statistics was employed as a data base for a statistical analysis of railroad traffic flows. This rail data was analyzed to develop quantitative estimates of traffic which might be considered captive to railroads under a range of alternative threshold tests, combination tests and prior segmentation. This analysis also provides one basis for judging the potential effectiveness of alternative procedural designs.

The second phase of the empirical analysis consists of selected industry analyses. The five major industry groups analyzed include: coal, metals and metal products, grain, processed food products, and forest products. This qualitative market research focused on the perceptions of shippers as to the availability of transportation alternatives for the major movements of their commodities. Another thrust of this research was to clarify the meaning of "shipper bargaining power." Chapter VI reports the results of this research. This industry analysis provides the ability to partially verify the validity of the empirical results.

The results of the empirical analysis combines the quantitative and qualitative phases. The integration of these two phases will be presented first in Chapter VII - Interpretation of Empirical Analysis, with additional discussion in Chapter VIII - Procedural Issues and Alternatives for Implementing Market Dominance Provisions. The actual results of the two phases of the empirical analysis are given in Chapter V - Results of Empirical Analysis and Chapter VI - Assessment of Railroad Market Position for Selected Commodities.

STATISTICAL ANALYSIS

The empirical analysis for this study is supported by a number of statistical analyses with the ultimate goal of identifying potential captive and competitive rail traffic. The final output of the statistical analysis is to construct a framework whereby the analysis of procedural alternatives can be supported by a large amount of quantitative information. The statistical framework is not to be used in isolation for segmentation. Quantitative results can not replace the needed understanding of various social, political and economic factors.

The statistical framework developed in the study provides a range of measures of potential railroad market power. It also points out the circumstances where shipper abuse may take place by demonstrating the lack of alternative transportation means and/or the lack of competitive behavior by rail carriers. The statistical framework can provide insight into how important evidentiary requirements can be appropriately handled in market dominance procedures.

The statistical analysis is used to test a number of different theories and hypotheses underlying the concept of market dominance. Realizing that the concept is multidimensional, the approach is comprised of a number of hypotheses; each one of them is theoretically related to the phenomenon of market power. These relationships are based on the principles of transportation economics, however, their applicability can not be taken for granted until empirically tested. This requires the incorporation of a data base into the framework and the evaluation of the results as to whether they correspond to a general understanding of transportation economics. Given some degree of measurement error, sampling problems, and insufficient theoretical rigor, not all the results are meaningful. Nevertheless, valuable information can be obtained on an aggregate level.

The statistical analysis was performed in two stages. The first stage is the application of tests of rail market power to the data base and then the combination of these tests in various ways. One way involves construction of an index reflecting the degree of relative market power of the rail carrier. The index reflects the interaction of a number of measures of "captivity". Another way involves a combination of tests using an "either/or"

logic which assumes that if one form of competition is present it is sufficient for competitiveness to be relied upon for shipper protection. The measures of competitiveness are based on economic principles which are discussed in the next section. These measures are entitled:

- Transportation Rate Differential Test
- Rate/Service Differential Test
- Market Share Trend Test
- Intramodal Competition Test
- Demand Stability Test
- Rates Service Differential Test/Intramodal Competition Test
- Rate Differential Test/Intramodal Competition Test
- Revenue to Variable Cost Ratio Test

Each of these measures is derived from a theory of the phenomenon of market power.

The second stage of the statistical framework is a set of special purpose measures providing more information on the nature of the traffic. Although these tests do not directly relate to the issue of market dominance, they contribute to the background against which dominant or non-dominant traffic is examined. They are:

- Demand Instability Test
- Noncompensatory Rate Test
- Shipper Bargaining Power Test
- Seasonality Test
- Average Revenue to Cost Ratio per Railroad Test
- Joint Rate Differential/Delivered Price Increase Test

This chapter contains a discussion of the actual methodology employed in each of these two stages of statistical analysis.

PROCEDURAL ANALYSIS

The empirical analysis is designed to support the practical needs of various procedural alternatives for identifying market dominant traffic. During the analysis, a number of alternative procedural designs were considered either because they resembled the existing rebuttable presumptions or because they appeared potentially to achieve the objectives for procedural design. Generally, the procedures fell into one of the following generic classifications.

1. Prior segmentation. This is a method by which market dominant traffic is identified by prior research work, and its key transportation characteristics are determined. A Commission ruling, perhaps as a result of a subsequent Ex Parte Proceeding, would be required which declared all traffic possessing certain readily observable characteristics to be market dominant. All other traffic would be presumed to be either competitive, market dominant, indeterminate, or to be handled by some other aspects of regulation (such as noncompensatory, regional, and seasonal traffic, deregulation, etc.).

2. Combination tests. Market power is observable when there is evidence that few or only one producer is in a market and when producer's prices result in profits which exceed the "normal" return on investment. This principle leads to combination tests for railroad market power where both transportation alternatives and carrier profits are considered. These tests can be applied procedurally either as joint rebuttable presumption tests (conceptually similar to the existing tests but used jointly rather than individually) or as a threshold test which determines the procedural treatment for a given rate case.

3. Single threshold tests. In some procedural designs, one simple test is called for as a means of determining the type of procedural treatment for a given case. For example, a threshold test might call for a rate over two times Rail Form A variable cost to be automatically suspended and investigated; or it might indicate that the shipper bear the burden of proof for any protest where the rate/variable cost ratio is under 1.6.

TEST FOR NON-COMPETITIVENESS--THEORY

(a) Underlying Assumptions

The concept of market dominance, defined by the 4-R Act as "the absence of effective competition", is complex and lacks both theoretical and operational rigor. The theoretical basis of market dominance is market power. However, since the latter is a continuous concept, it is not possible to determine a priori at which point abuse "starts." Consequently, there can be varying degrees of market power.

From the perspective of market dominance procedure there are two ways of dealing with the continuous nature of market power. An approach which places greatest stress on shipper protection and the role of regulation in controlling transportation markets rests on the assumption that full shipper protection is provided by the market place only when all or nearly all competitive forces are at work (as determined by the several empirical tests). It is assumed that with less competitive activity, regulatory intervention may be required to protect shippers. A contrasting approach takes the opposite assumption: if any one form of transportation market competition is present, that competition alone provides better shipper protection and better market functioning than regulatory intervention could. The latter approach is clearly oriented to a minimum regulation/ maximum rate freedom approach.

Empirical analysis was applied to the data under both of these approaches. A scoring system which combines several tests for non-competitiveness was applied to the rail transportation data base. Its objective was to identify reasonable groupings of traffic for which an index of competitiveness could be developed-that is, a continuous measure of rail market power such that non-market dominant traffic could be identified in terms of multiple competitive forces at work. In addition to this methodology based on joint applications of the test, other combination tests were developed which are intended to identify traffic where at least some form of competitiveness in present, in accordance with the second view of market dominance implementation. These combination tests are made more meaningful by the addition of considerable statistical analyses performed to reveal their interactions and interdependencies.

(b) Construction of the Tests

The construction of the test framework took place in three steps. First, all the movements on the Waybill Sample were individually subjected to the set of tests. The results were recorded for each of these movements and were then ready for assimilation into a scoring procedure.

The analysis proceeded to the second step where the movements were stratified by a number of attributes (such as weight class, mileage blocks, commodity groups and rate territories). This permits aggregation of movements which have common attributes into study cells. By varying the attributes, relationships between certain attributes and the level of market power can be evaluated. In this manner, the characteristics of market dominant traffic are more precisely identified. In effect, cells of traffic have been constructed which share a set of common attributes. The groupings used include 127 commodity groups (Standard Product Codes (SPC) as defined in Exhibit IV-1), 5 mileage breaks, 4 weight classes, and 5 rate territories. The total potential number of cells is 12,700.

The third step is to examine the number of tests passed for all movements in a particular cell. The statistical distribution of the scores in each cell is of interest. For example, the mean score (number of tests passed) of any cell describes the average number of test passed for movements sharing a particular set of attributes. In essence, the mean measures the relative level of market power of the movements. As the number of tests passed increases, the level of confidence in the finding of market power increases. The underlying assumption is that each positive test result (finding of market power) contributes to the final identification of the degree of market power for that set of movements.

The level of confidence in the mean is influenced by its standard deviation. The size of the standard deviation may increase to a level where the average number of tests passed becomes inconclusive and, therefore, no statement with respect to the potential degree of market dominance can be made. It should be noted that, as the number of records or movements in the cell increases, the mean more accurately reflects the movements grouped in the cell.

These cells and their statistics constitute the building blocks of the test framework. Finally, these cell statistics are summarized by SPC commodities. Various information, such as the percentage of market dominant carloads, average cell mean, number of movements passing each of the tests, and other relevant statistics are presented in Chapter V.

(c) Concepts Underlying the Tests

As mentioned earlier, the concept of market dominance is too wide to be captured by any one test; thus, each of the tests defines market power from a different perspective. Theoretically, each constitutes a necessary, but not a sufficient condition for the presence of market power. This means some degree of market power may be detected when the test result is positive, but the absence of a positive result from one test does not preclude the condition of market power, especially when another test is positive. The theory underlying each test is presented below.

1. Transportation Rate Differential Test. The relative level of transportation rates is necessarily an important factor influencing the demand for rail service. The transportation rate difference between railroad and motor carrier is measured as a ratio (truck rate to rail rate) for the Transportation Rate Differential Test. When the rates are estimated for an identical shipment, the relative rate advantages can be perceived. The rate advantage, in turn, represents a measure of the feasibility and the substitutability of the alternative modes available to a shipper.

The motor carrier rate is estimated from engineered costs developed by Kearney's truck costing model, presented in detail as Appendix A. The rail rate used in this test is the higher of rail revenue or fully allocated Rail Form A cost. In essence, potential rather than the present level of competition is measured by this test.

When interpreting the test results, the following limitations should be recognized. Direct transportation cost is only a part of total distribution costs. There are cases where, although some direct transportation cost saving is achieved through a modal shift, other parts of the distribution system become more costly. For example, switching to railroad may reduce the freight charge, but increased inventory cost due to less frequent delivers may negate the saving.

Another limitation of the measure is cost reflects only one dimension of the shipper's concern. The range of "service quality" characteristics of a specific transportation service influence the shipper's modal choice, although they are not directly measurable. Service differentials (such as loss and damage, schedule reliability, delivery frequency, and transit time) have been responsible for the increasing truck market share despite higher truck freight charges.

2. Rate/Service Differential Test. This test attempts to incorporate a measure of the service difference between truck and rail as well as rates in assessing the level of competitiveness of these modes for a given movement. Truck service quality has an economic value which may justify its increased cost over rail shipment. This test incorporates a measure of the influence of transportation cost in the product market.

Truck shipment typically has advantages service characteristics over rail shipment. These advantages are very significant for specific commodities. In this test the transportation ratio (the share of transportation cost of the total delivered value of the commodity) is used to construct a proxy for the value of service. The test also attempts to limit the value of the service in terms of the effect in the product market.

The test is constructed so that the service differential is measured in terms of an increase in the transportation ratio. Truck is considered competitive to rail as long as a rail movement can be switched to truck at less that a specified percentage increase in the delivered value of the product. This approach was selected over a flat percent of the rail rate in order to relate realistically to the "service" value of truck used as a threshold in the test to the type of movement in terms of length of haul, value of the commodity, and importance of transportation cost in final markets.

3. Market Share Trend Test. In analyzing market power, it is important to observe the change in market share among alternative modes for a given commodity and geographical market over a period of time. The Market Share Trend Test is based on the modal share shift calculated from the 1967 to 1972 Census of Transportation Survey. This intertemporal approach provides a dynamic view of intermodal competition. If the rail market share trend for a certain commodity is constant or rising, it can be inferred that railroads may have a comparative advantage and may possess market power over the shipper. Conversely, if the rail share is decreasing, railroads can be viewed as having a comparative disadvantage or shippers may have other long run alternatives to more costly rail service.

It should be noted that observed changes in market share result from a number interacting factors, not all relating to intermodal competitiveness. Regional supply and demand for the commodity affects the extent of transportation needs. The growth or decline of a regional industry may cause the commodity distribution system to change.

4. Intramodal Competition Test. Another measure of market power is to assess the extent of intramodal competition. Presently, effective price competition between carriers serving the same markets is minimal or non-existant because rates are usually collectively set. Competition between carriers is primarily related to service and equipment supply. Given this condition, research has revealed a distinct competitive advantage to the single line movement over the multi-line movement. With the possibility that collective rate-making activitiy may be eliminated or severely restricted, effective intramodal price competition may become a competitive influence.

The Intramodal Competition Test uses the Waybill Sample to identify the number of carriers presently participating in the traffic between two BEA regions (See Exhibit IV-2). This provides some measure of the degree to which potential price competition may exist without collective rate-making.

It is important to note that only carriers presently participating in the traffic are included. It is assumed that other potential carriers are not involved because of the lack of competitive service or an unsatisfactory level of profitability.

There is a certain amount of measurement error caused by the size of the BEA regions used in the analysis. As the regional unit becomes larger, there is the tendency to have a larger number of carriers serving the region although these carriers are not necessarily competing against each other. In smaller regions, the bias works the other way; carrier competition in the area is considered, but the carriers may face competition from adjacent regions which is not considered.

5. Demand Stability Test. From the perspective of market dominance, stable demand rail traffic often include traffic with few transportation alternatives. Due to the characteristics of the commodity and length of haul, some shippers find alternate carriers or modes economically infeasible and depend on one rail carrier. Substantial investment on part of the shipper may also contribute to stable demand. In this sense, stable markets have the potential of being "captive" markets and deserve careful review. Again, since demand stability does not constitute a sufficient condition for the finding of market power by itself--it is conceivable that there

may be carrier competition for a stable market--the test is to be used in conjunction with the other tests.

It should be noted here that the reverse of this test is the demand instability test which is constructed as a special purpose test. The measure of instability, rather than stability, is more meaningful in terms of the regulatory framework. When the demand for the rail service is unpredictable and unstable, the Commission may not be able to regulate the maximum rate as it is difficult to prescribe a rate which does not exploit the shipper yet provides adequate revenue to the carrier. The full discussion of this problem is presented with the discussion of the Demand Instability Test.

6. Rate Service Differential Test/Intramodal Competition Test. The concept underlying the joint test approach is that when market power is observed simultaneously in two tests, more weight should be given to the observation. The occurance of a large increase in the delivered price and lack of intramodal competition in the same movement increases the reliability of the measurement of market power. In this case, one may think of a shipper who finds the rate increase too large to pass onto the receiver and yet can not find an alternative rail carrier. The joint test gives particular weight to such a situation.

7. Rate Differential/Intramodal Competition Test. This test employs the same weighting concept as the previous test. It depicts the situation where the shipper finds the transportation rates of the other modes too expensive and yet can only reach one railroad.

8. Revenue to Variable Cost Ratio Test. The revenue/cost ratio serves as a relative traffic profit contribution profitability measure. The relationship between above normal profit and market power has long been researched. The hypothesis is that, through market power, the carrier can charge a higher rate than the rate chargable under a competitive situation. Thus, if one railroad dominates certain traffic due to the lack of other competition, the revenue to variable cost ratio would reflect such a situation. However, as the rail industry has been under decades of regulation, the revenue charged may not actually reflect the optimal pricing behavior under a unregulated market structure.

Exactly how the maximum rate regulation and common carrier responsibility affect the observed revenue is not clear. Although generally one can state that market power produces profit, profitability is not a sufficient condition to conclude the existence of market power. Profitability can indicate competitiveness rather than its absence. An innovative carrier having a high revenue to variable cost ratio as a result of efficient resource allocation, has his innovation rewarded. But continuous high profits without further productivity increase reflects entry barriers to other potential competitors. The distinction between the two cases has been difficult to determine on both theoretical and empirical levels. Under these circumstances, this test should be only used as complement to other measures of market power. The mere passing of this test does not constitute sufficient evidence of market dominance.

The above discussion described the theoretical basis for the tests employed to measure non-competitiveness. The next section describes the empirical definition and data used to execute these tests.

C - EMPIRICAL ANALYSIS

DEVELOPMENT OF DATA BASES

The One Percent Rail Waybill Sample for 1977 constituted the starting point in the development of a refined data base for the estimation of rail market power in various traffic segments. In this section, the procedure employed to create the data base is described.

The following discussion is organized into four subsections which explain the characteristics of the Waybill Sample, the rail costing procedure applied to it, the motor carrier costing procedure applied to it, and lastly, a summary of the strengths and weaknesses of the resulting data base. The intentions of this section are threefold: first, to make clear the assumptions employed; second, to explain the strengths and weaknesses of the resulting data; and third, to make it possible for interested parties to replicate the results and test their validity if so desired.

(a) Waybill Sample Characteristics

The One Percent Waybill Sample is a data base prepared by the Federal Railroad Administration. It contains data for all terminating railroad waybills with numbers ending in "01" except for certain LCL (less than carload) movements and except for shipments originating in Canada and Mexico. The original 1977 Waybill Sample contained 180,945 records. A complete description of the Sample as produced by the FRA is provided in DOT document TD-1 for 1977 published in July, 1978.

In its original form, even after FRA editing and refinement, the One Percent Sample contains numerous data errors and omissions. Moreover, only originating and terminating carriers, no intermediate carriers are shown, and the mileage for individual carriers is not given. As part of an earlier project for the ICC, Kearney was provided with an enhanced version of the Waybill Sample, processed under FRA contract at Princeton University. This processing corrected large numbers of incomplete and obviously incorrect records and added detailed routing information determined by application of a sophisticated computer model of the United States rail system. The routing data includes the carrier on each segment, mileage for each carrier,

and specific interchange points. This version is the one employed in this study.

The Waybill Sample data was further enhanced by utilizing the following information.

1. ICC Car Type. A two digit ICC numeric code which describes the type of car used in the movement. These car type codes are the ones used for costing purposes in the published ICC Carload Cost Scales for 1975.

2. SPC Commodity Code. The 127 commodity groups of the Special Projects Counsel (see Exhibit IV-1).

3. Origin and Destination BEA Region. The economic area in which the movement originated or terminated. One of 173 regions delineated by the Regional Economics Division, Office of Business Economics, U.S. Department of Commerce (see Exhibit IV-2).

In general, three types of records appear in the Sample:

- single car movements
- multiple car movements--carloads specified
- EM-5 waybills, multiple car movements--number of actual carloads not known.

For single car movements and multiple car movements other than EM-5's, the Sample represents approximately one percent of waybills (not carloads) with an average of 1.06 carloads per waybill. EM-5 waybill records in the Sample constitute approximately one percent of all carloads moved in multiple car shipments on EM-5 waybills.

(b) Rail Form A
Costing Procedure

One of several indicators of the competitiveness in a market is the relationship between production cost and revenues. Thus, and essential feature of the data base in this project was an

estimation of the railroad's costs for each waybill record in the Sample. This cost information was available for this project as a result of prior work performed by Kearney for the ICC under contract #ICC-78-C-0006, Application of Rail Form A Costing to the Waybill Samples for 1973 through 1977.

The costing procedure involved a major development effort in which regional carload cost scales and individual carrier carload cost scales were produced for each year. Then the One Percent Waybill Sample movements were individually costed using standard Rail Form A costing methodology on both an individual carrier and a regional basis. Since the sample enhancement added the mileage for each carrier on each movement, a separate cost could be calculated for each carrier as well. For this study of market dominance, the detailed cost results from the earlier study (based on individual carrier Rail Form A costs) were summarized into a variable cost and a fully allocated cost (ton and ton-mile allocation) value for each movement in the Sample.

The costing procedure is fully documented by Kearney's report to the ICC on its earlier contract. However, to understand the costing procedure as it relates to the current study, the following factors must be recognized:

1. The accuracy of individual waybill cost calculation is limited by the lack of detail in the Waybill Sample records, even after enhancement. This is a particular problem in the following ways:

- -- The actual number of original carloads on EM-5 movements is not given and must be estimated, thereby impacting the savings per carload for reduced switching costs.
- -- The proportion of way train and through train miles must be estimated.
- -- Unit train movements are not explicitly identified and are costed as large multiple car movements, thus overstating the costs somewhat.

- -- Intermediate classifications not in conjunction with interchanges are not explicitly recognized.
- -- Unusual conditions relative to origin and destination switching are not recognized.

2. The Rail Form A costs employed are based on average costs for all movements on a given railroad. (Published Carload Cost Scales, by contrast, are based on regional averages for all movements of several railroads combined.) Factors relating to different levels of resource utilization on various parts of individual railroads are not recognized.

3. This procedure is retrospective in that the "costs" are developed from accounting data which rests on a historical cost foundation. They indicate generally the level of the margin of revenue over cost in prior years but do not indicate if the current rate is adequate to justify new investment, especially given the high inflation rates on railroad equipment, construction, and other capital items.

4. Cost of capital in Rail Form A costing reflects the current cost to the railroad of all its existing capital. Since railroad debt is generally quite old in the aggregate, Rail Form A cost of capital values are based on the lower interest rates of an earlier era. This problem was recognized by the Commission in Ex Parte 353, where the overall railroad cost of capital was determined to be 11.6% currently. Cost of capital values employed in the Rail Form A procedure in this study were consistently below this figure.

Despite these real limitations, Rail Form A costing is the only widely recognized, uniform railroad costing procedure. Furthermore, it is useful in analyzing the relative profitability of major groups of movements. Also, it provides a convenient basis for comparison against revenue in procedural settings where a cost methodology accessible to all parties is desirable. For these reasons, the use of Rail Form A costs in this study is appropriate.

(c) Motor Carrier Costing Analysis

Another important element in the assessment of the competitiveness of rail markets is determining the extent of availability of motor carrier transportation at a cost close to rail rates. As the starting point in this analysis, a costing algorithm was developed for the purpose of computing an equivalent motor carrier cost for rail movements in the One Percent Waybill Sample. This cost was computed for each of eight service types as given below:

Common Carrier - Union Driver
Common Carrier - Non-union Driver
Exempt Commodity Carrier - Company Driver
Contract Carrier - Company Driver*
Private Fleet - Union Driver
Private Fleet - Non-union Driver
Owner Operator - (in agricultural commodity service)
Contract Carrier - Company Driver - Double 40 foot trailers (not used in truck/rail rate comparisons)

The costing methodology is presented in detail in Appendix A of this report, together with the actual cost tables. In general, the methodology consisted of a three-stage process. First, the appropriate trailer type was determined based on the rail car type and commodity. In the second stage, the number of trailers per rail carload was estimated. Finally, in the third stage, a cost per trailer movement was computed and then converted to an equivalent truck cost per carload of freight.

In order to properly interpret the subsequent analysis of truck/rail cost ratios, it is necessary to understand the costing model's capabilities and limitations. The model was designed to compute a range of motor carrier costs for movements in the Waybill Sample, i.e., with relatively limited information

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* When contract carriers employ owner/operators, it is assumed that the price charged the shipper will be the same as the rate derived from company driver costs. The difference between actual owner/operator earnings and this rate is taken by the contract carrier for overhead costs and profit.

on movement characteristics. The results were intended to represent an estimate of what a fully cost-based freight rate might be for the movement and, as such, were designed to be compared against rail rates, not rail costs. Since the cost tables constructed for this cost model contain average or typical values, the best use of these costs is in analyses of groups of movements rather than of individual Waybill records.

Some of the uncertainties with regard to assumptions of weight capacity, empty backhaul ratios etc., were recognized by estimating a range of costs for each service type. The high cost range is predicated upon smaller trailers (13' high vans), more restrictive gross vehicle weight restriction (73,280 lbs. max.), and relatively high empty backhaul ratios for most bulk commodities. A low cost range estimate was also calculated based on larger trailers (13' 6" high vans, 45' long bulk carriers), less restrictive gross vehicle weight restrictions (80,000 lbs. max.) and substantially lower empty backhaul ratios for bulk commodities. Actual costs for specific movements might reasonably be expected to fall somewhere in this range, given the other assumptions in the costing methodology.

The most significant element of uncertainty in computing equivalent truck cost for a given rail movement (in the absence of very detailed information on commodity characteristics) is the conversion to number of truckloads per equivalent carload. Special product configuration or characteristics may lend themselves to better utilization of railcar (or trailer) cubic capacity than that of other modes. A good example of this is 4'x 8' plywood sheets, which can be piled in a boxcar with the 8 foot dimension across the width of the car; the 90 inch inside width of a trailer van body precludes efficient utilization of trailer cubic capacity no matter how the plywood is oriented. Flat bed trailers can be employed to haul plywood; however, the cost of load protection against weather, vandalism and pilferage becomes significant. Such exceptional situations cannot be fully accounted for by any general carload to truckload conversion algorithm.

The conversion process described in Appendix A is not immune to these problems. To compensate for this problem, the process was biased somewhat in favor of higher numbers of trailers per carload by forcing the conversion on the basis of railcar cubic

capacity whenever the weight of the load was less than 90% of the car's weight capacity. Since few cars are loaded to 100% of their cubic capacity (particularly in the case of boxcars), lightly loaded movements will tend to call for more trailers than might actually be required. Of course, in all cases where the vehicle type requires recognition of cubic capacity, weight capacity is considered also; the number of trailers used in costing a movement was the higher of the number from the cubic capacity and weight conversions.

As a final element in this discussion, a number of the significant assumptions and characteristics of the costing process are presented in the following paragraphs. They suggest the practical limitations in the use of the data:

1. Motor carrier costs, which do not vary by mileage, were allocated to trailer-miles run based on assumptions regarding trailer-miles per year. These mileage assumptions were adjusted downward for movements under 150 miles. For movements under 50 miles, these costs are probably understated.

2. Owner-operator wages were computed from probable earnings in alternative employment plus living expenses on the road. In some instances, owner-operators are observed charging less than these rates in order to cover out-of-pocket expenses during periods of slack demand.

3. Pickup and delivery costs were estimated based on average or typical conditions. Unusual conditions, such as very congested urban areas or very long truck loading times, were not recognized. It should be noted, however, that motor carrier pickup and delivery costs do not vary as much between urban, semi-urban, and rural areas as might be supposed (at least on an average cost per load basis), since in less congested or rural areas, the greater distance travelled are offset by the higher possible average speed.

4. The entire focus of the costing process is on truckload movements. Less-than-truckload movements involve cost elements for break-bulk facilities and terminal handling which are irrelevant to this analysis. This emphasis on truckload movements makes it impossible to compare these costs directly with Highway Form A or B costs since the latter reflect terminal handling expenses of LTL carriers in their cost tables.

Briefly stated, the costing approach employed constitutes a relatively conservative methodology based on researched cost data which provides a reasonable range of costs when applied to the varied movements which are to be analyzed in the aggregate. Within a reasonable distance range (over 50 miles) and for commodities which do not possess extreme dimensional characteristics, the resulting cost range estimates can provide insights into the relation between potential motor carrier cost based rates and rail rates.

OVERVIEW OF DATA BASE

The data base which evolved from numerous enhancement and costing programs is a carefully edited sampling of actual railcar movements. In the analysis of each movement, the information analyzed included: origin and destination carriers and locations, individual carrier Rail Form A costs (both variable and fully allocated), motor carrier costs for eight types of service, both high and low range, and car ownership data.

At each level of processing, tests were performed to remove records which, for one reason or another, were either missing essential data or contained unreasonable data. In addition, TOFC/COFC records were omitted (approximately 15,000) since the number of trailers per car is not given in the waybill record. This makes the costs highly suspect for anything but a regional aggregation; it was felt that TOFC/COFC movements are generally truck competitive and that their omission would not substantially weaken the analysis. As a result of this editing, the data base employed for this study contained approximately 141,000 records. The overall validity of the sample was not impaired because the defective records eliminated from the sample were found in nearly identical proportions within each of the 127 SPC commodity groups. This reduction in the sample size is significant, however, for any attempt to expand this data base for estimating total actual rail movements.

TEST FOR NON-COMPETITIVENESS--MECHANICS

This section stresses the mechanical construction of the tests for non-competitiveness. The concepts underlying these tests have already been outlined in the previous part.

(a) Transportation Rate Differential Test

In the Transportation Rate Differential test, a ratio is created by dividing the lowest truck cost by either the fully allocated rail cost or by rail revenue; the higher of the fully allocated cost or the revenue was used. If truck costs to revenue or fully allocated costs is a ratio of greater than one, the test is passed, indicating the potential for existence of market power.

Due to the nature of the commodities, they are divided into two parts. SPC's 1-14 comprise one part; the remaining SPC's (15-127) comprise the other. The first group of SPC's (1-14) is analyzed with whichever is the less expensive truck cost: Exempt Commodity Carrier, Company Driver, or Owner Operator. These two types as defined in the costing model are truck costs which relate only to the transportation of agricultural products (SPC's 1-14). These SPC's are:

1. Cotton
2. Wheat
3. Corn and Sorghum Grains
4. Barley
5. Grain, all other
6. Soybeans
7. Rice
8. Potatoes, other than Sweet
9. Sugar Beets
10. Citrus Fruits
11. Apples
12. Deciduous Fruits
13. Fresh Vegetables
14. Melons

From the remaining SPC's (15-127), the least expensive of five truck cost options was chosen as the factor for the ratios. These truck costs are for: Union Common Carrier; Non-union Common Carrier; Contract Carrier--Company Driver; Private Fleet-Union; and Private Fleet--Non-union. It is assumed that when Owner-Operators work for Contract Carriers, the rate charged the shipper is the same as when a company driver is employed.

Under current regulations, some railroads' revenues are less than their fully allocated costs. As the test is intended to

assumed that the railroads would raise their revenues to the level of their fully allocated costs. Thus, the higher of the two figures will be used, as it will better reflect the potential modal competition.

The data base used for this test involves the One Percent Waybill Sample, the Truck Costing Model, and the Rail Costing Model. The Truck Costing Model is described in detail in Appendix A. The limitations of the data base have been discussed in a previous section of this chapter.

(b) Revenue/Variable Cost Test

The structure of the Revenue/Variable Cost test is a ratio of revenue divided by the variable costs. If this ratio is greater than a specified threshold, the movement passes the Revenue/Variable Cost Test (i.e. indicates the potential for existence of market power). Six outcomes are recorded from this test using thresholds of 1.3, 1.4, 1.5, 1.6, 1.7, and 1.8. The outcome of this test is uncertain because the "interference" of the rail regulatory program cannot be incorporated easily in terms of its effects on revenue/cost relationships and the maintenance of historic rate structure relationships.

(c) Rate/Service Differential Test

This test is intended to measure the possible contribution of truck service as part of the competitive alternative to rail. This is done by limiting the value assigned to that "service" in terms of the increase in the delivered price of the commodity using truck instead of rail. The truck costs, as in Transportation Rate Differential Test, are associated with the appropriate SPC category. Like the Transportation Rate Differential Test, the lowest price of those relevant to the SPC category is used in the calculations. The numerator of the equation is based on the difference between the truck rate and the rail rate. As the truck rate is assumed to be higher, the rail rate is subtracted from it. The denominator of the equation is the value of the commodity added to the railroads' transportation rate. The value of the commodity used here is the value per ton presented in Exhibit IV-3. Together, they form the delivered price of the commodity.

After these calculations, SPC commodities which are homogeneous in nature score on the Rate/Service Differential Test (i.e. indicate the potential for existence of market power) if the increase is greater than three percent. These SPC's are:

1. Cotton
2. Wheat
3. Corn and Sorghum Grains
4. Barley
5. Grain, all other
6. Soybeans
7. Rice
8. Potatoes, other than Sweet
9. Sugar Beets
15. Iron Ore
16. Non-Ferrous Concentrates
17. Calcined or Activitated Bauxites
18. Anthracite Coal
19. Prepared Bituminous Coal for Metallurgical or Coking Purposes
20. Prepared Bituminous Coal for Fuel or Steam Purposes
21. Lignite, Prepared or Raw
22. Fluxing Limestone & Dolomite
23. Construction Aggregates
24. Industrial Sand
25. Clays, Dry,other than Fire Clay
26. Feldspar
27. Potash Fertilizers
28. Phosphate Rock
46. Pulpwood Logs
47. Pulpwood Chips
74. Anhydrous Ammonia
75. Superphosphate
76. Agricultural Chemicals, including Fertilizers
80. Salt, Rock and Common
81 Carbon Blacks
87. Petroleum Coke
88. Coke Produced from Coal
92. Hydraulic Cement
93. Brick or Blocks, Clay or Shale
95. Lime

All other SPC's score on the test if the delivered price increase is greater than five percent. That is the truck rate differential over the rail rate is more than 5% of the delivered price of the product. (However, fresh fruits and vegetables were included with five percent grouping because of service sensitivity

have been identified as such and treated differently because within their given market, greater competition exists. It is possible, within these SPC's, for a seller to lose his market share due to a minor percentage price increase.

(d) Market Share Trend Test

The Market Share Trend Test attempts to identify the percentage of change in traffic share among alternative transportation modes for a commodity grouping. The Census of Transportation Survey has been used to calculate the percent changes from 1967 to 1972. If the rail percentage share trend of the transportation for a certain commodity is constant or rising, it can be inferred that the railroads may have a comparative advantage; they, potentially, possess some market power. Conversely, if the rail share is decreasing, railroads can be viewed as possibly having a comparative disadvantage. The test is hampered by the lack of some important commodities from the census data, such as agricultural products, bulk materials, minerals, and lumber. In addition, there were numerous markets in the 1972 Census for which there were no comparable figure in the 1967 Census including originations in most New England states. The bulk commodity deficiency is covered by utilizing the Quarterly Commodity Statistics Data for the ten most important commodities for rail carriers and comparing the trend of traffic increase or decline with statistics for annual increases in production. There was no means by which missing 1967 movements could be estimated; in these markets rail share was assumed to have declined. Where a railroad's traffic share was found to be stable or rising for a given state-tostate commodity movement, it passed the test. All sample movements in that catagory were scored accordingly.

(e) Intramodal Competition

The Intramodal Competition Test measures the traffic share among individual railroads in specified commodity and regional groups. The approach is to examine the traffic share of the carriers instead of their pricing behavior. The traffic share approach does provide some information on the potential competitive behavior of the railroads if the traffic is deregulated and the exemption from anti-trust law removed. As such, the extent and the nature of the competition can not be determined from this test without more detailed information about the cost, route, and ownership structures of the railroads.

Intramodal market power is considered for three types of carriers: origination, destination, and a combination of the two. Thus, this test is divided into three segments, each with its own score. Through the One Percent Waybill Sample, which has been divided into SPC categories, the activities of each carrier or combination of carriers operating within the given SPC and BEA-to-BEA traffic groups is examined to determine if one carrier has more than 70 percent of the rail traffic share in any of the defined groups.

First, all the originating carriers are examined for a traffic share of 70 percent or above. If one carrier is discovered to possess the requisite minimum of 70 percent, the test is passed (i.e. the potential for market power exists). Next, all the destination carriers within the same SPC and BEA-to-BEA definitions, are searched to identify one destination carrier with a 70 percent or above traffic share. Again, if one carrier fulfills the requisite, the test is passed. Finally, combinations of originating and destination carriers are examined as one unit for market share. The test is passed if one combination of originating and terminating carriers is found to have 70 percent share or above of the total traffic.

(f) Demand Stability Test

Stability in the demand facing a carrier allows him to possess a degree of bargaining power toward the shipper. In some cases, this indicates the lack of alternatives on the part of the shipper. As previously discussed, the stability condition, by itself, does not constitute an adequate condition for market power. When used in conjunction with other tests, it may support the finding of market power.

This test is based on empirical research done under a previous contract with the Interstate Commerce Commission (Contract No. ICC-76-6). Stability was examined by means of an analysis of AAR carload statistics. A procedure was developed for measuring variability and patterns. This was done as a means of isolating seasonal traffic. The data created was used as input for this study. For this study, seasonal multipliers were created by examining all railroads and the Association of American Railroads' commodity groups. Five years of commodity movements were studied. Observations of the number of carloads were made on a weekly basis. However, the first year was used to establish a moving average and became a benchmark against which

to measure variation of weekly traffic. The moving average was calculated for the five year period. The ratio of the present week's carloads to the previous fifty-two weeks serves as the stability measure.

The demand for the railroads' services is considered to be stable if two conditions are met: 1) if the standard deviation of the weekly ratio over the four years is less than 1.25; and 2) if fewer than twenty sign changes occur in one year, where the ratio cross the boundary of 1.0, either from the positive to the negative, or vice versa. Any traffic with the matching originating carrier and STCC combination passes the test.

A limitation of the Demand Stability Test is in the aggregation of carloads across the commodity group. If a large volume of movements takes place within a given commodity group, the instability which may exist for one product within the commodity group may be masked by offsetting product movements in the group as a whole.

SPECIAL PURPOSE TESTS

This group of tests is not included directly in the scoring measure of relative market power. They are for informational purposes only, intended to better describe the grey area of market power. Briefly listed below are the titles of the tests.

- Demand Instability Test
- Non-compensatory Rates Test
- Shipper's Bargaining Power Test
- Average Revenue/Variable Cost per Carload Test
- Joint Rate Differential/Delivered Price Increase Test

(a) Demand Instability Test

As mentioned in Chapter III, traffic facing fluctuating or uncertain demand should be considered for deregulation since it is not practically feasible to determine the appropriate rate to

obtain adequate revenue for the railroads. Such a simplistic approach can now be refined toward actual application. As a tool of traffic segmentation, the analysis, first of all, should not be concerned with the traffic which is shown to be non-market dominant due to the presence of competitive alternative carriers or modes. Such traffic would have been already considered as non-market dominant through other analyses. The instability analysis should stress the traffic which has unstable demand, but for which there are no transportation alternatives.

It is not clear if such a situation should be totally deregulated when new but unstable traffic flows develop. In this instance, carriers would be able to establish a higher rate than would be dictated by a competitive market situation. For example, a marginal coal mine may open due to a sudden rise in coal price; consequently it may be willing to bid a high rate for the only available transportation. The carriers then may temporarily reallocate their equipment toward the new lucrative business and create sudden service shortages in the competitive sectors. The actual likelihood of such conditions occurring frequently on a significant basis is an empirical question.

The empirical background of this test is similar to the Demand Stability Test. The same measures and standard deviation are employed to sort out the movements facing unstable demand. These movements are again grouped by origination carrier and commodity. Any group having a stability measure standard deviation of more than 1.3 and more than 17 sign changes with respect to the main volume is considered as unstable.

(b) Non-compensatory Rate Test

A rate is determined to be non-compensatory when the carrier's revenue is less than Rail Form A the variable cost for providing the service. This test is constructed to examine the revenue to variable cost ratio of the traffic in the Waybill Sample. When the ratio is less than one, the record is determined to be non-compensatory. Since each record has been examined, the percentage of non-compensatory carloads in the stratified cell units gives extra information on the nature of the traffic with the stratification characteristics (i.e., weight, length of haul, territory and commodity). For example, when the stratification scheme is changed from SPC by territory to SPC by weight, the percentage of the non-compensatory traffic also changes. Note the revenue and variable cost data are from Rail Form A and the test inherits the weakness of the data base.

(c) Shipper's Bargaining Power Test

Chapter III points out the concept of bargining power permits consideration of the market power on the side of the shippers. This counter-balancing of market power often neutralizes the carriers' potential to exploit the shipper even when alternate carriers or modes are lacking. Thus, in measuring market dominance, the characteristics of the shipper must be one of the key focuses.

Although there is an absence of comprehensive data base directly reflecting the shipper's bargaining power, one can examine the circumstances under which the shipper is likely to possess bargaining power.

1. Carrier's Investment in Special Equipment. When the carrier has already invested substantially in special equipment for carrying a particular commodity, it is in a weak position to negotiate a favorable rate for fear of losing the traffic and absorbing the loss due to such "mis-investment." The Waybill Sample reveals such a carrier's substantial investment and identify areas where this equipment is used for the handling of non-compensatory traffic.

2. Shipper's Alternative Locations for Production. If the shipper is a multi-plant firm, it can respond to the increasing rail rate by simply switching the production to a plant in another location. For the fear of losing the traffic, the railroad is in a weak bargaining position. It is thus crucial to examine the shipper in terms of the number of plants and the ability to switch production.

3. Shipper's Traffic Share. If a substantial portion of the traffic is tied to one shipper, the railroad is under the "monopsonistic" power of the shipper. Because of the large volume of traffic, the railroad hesitates to increase a particular rate for the fear of losing all the business from the shipper. Inbound-outbound tie-ins are an example of this kind of shipper's bargaining power. It can be detected by examining the traffic share of any particular shipper.

Given the limitations of the data base, the first situation can only be quantitatively observed. Through the Waybill Sample, non-compensatory movements where the railroad owns special equipment have been identified to reflect the shipper's bargaining power. Quite apparently, this is only a partial measure of the range of conditions which would reflect shipper bargaining power.

(d) Average Revenue/ Variable Cost Ratio Per Carload Test

In this test, each carrier's average revenue to variable cost ratio is calculated for traffic with the identical origination and destination carrier. This approach was adopted as a rough approximation of a carrier's over-all revenue/cost ratio because the divisions of revenue are not included in the Waybill Sample data. This data deficiency becomes crucial when one is interested in the carrier's traffic profitability pattern. It is important to note that so far profitability of a movement has been measured, rather than profitability of a carrier. Economic principle asserts that the profitability of a firm is one measure of market power on an industry level. Admittedly, it is already known that the general financial condition of the railroad industry is poor. Firm level statistics are useful in estimating the average profitability of the carrier's traffic. This test attempts to obtain this information by excluding traffic with multiple carriers.

(e) Joint Rate Differential/ Delivered Price Increase Test

Embedded in the transportation rate differential test is the concept of significant service differential between rail and motor carriers. This test attempts to identify the average rate differential for commodities having high value and low transportation cost ratio. From the fact that these commodities are presently using rail, despite their tendency to switch to truck, one may assume the present rate differential a lower bound for the service differential. For example, a shipper of these commodities is prepared to pay 20% service differential. If the truck to rail ratio is less than 1.20 the shipper will not use rail; if the ratio is more than 1.20, it is too expensive to switch over to truck. If the rate ratio facing the shipper is 1.3, the service differential can not be more than 30% but somewhere below it. Due to the nature of these commodities, truck is assumed to be in the competitive range, the averages can be a reasonable indicator of the upper bound on the service differential.

RESEARCH DESIGN OF INDUSTRY ANALYSIS

This section contains a discussion of the research design for the industry analysis conducted by A. T. Kearney, Inc. The following topics are discussed:

- Objectives
- Methodology
- Shipper Interviewes

(a) Objectives

The primary purpose of the industry analysis is to assess the potential for shipper abuse from the market power of rail carriers. The industry analysis is meant to be a qualitative assessment of key theoretical concepts developed in the previous interim report. The judgements made from this qualitative assessment of selected industries serve as an independent cross-check to the conclusions presented in Chapter V.

The key concept of the first Interim Report used in the statement of purpose is "shipper abuse". That report defined under what conditions users of rail transportation might be abused by the market power of rail carriers. These conditions are a lack of transportation alternatives to rail and a lack of shipper bargaining power. Transportation alternatives may not exist due to such factors as the geographic location of the shipper or the characteristics of the commodity being shipped. Similarly, the shipper may be considered to be in a weak bargaining position if he has no choice of routing on competing rail carriers or has no other alternative market to which he can ship his product.

Thus, the objective of assessing shipper abuse involves verifying the presence or absence of both transportation alternatives and shipper bargaining power.

(b) Methodology

The industry analysis is meant to focus on selected industries that are representative of major users of rail. The industries selected are used only as examples against which the empirical testing results are compared. In this context, the industry analysis is not, nor is it intended to be, an exhaustive review of major industries using rail transportation.

The industry analysis is based on three sources: published data on industry trends; proprietary files including extensive shipper transportation surveys conducted by A. T. Kearney, Inc. for the National Council of Physical Distribution Management; and additional shipper interviews conducted by Kearney.

(c) Shipper Interviews

Since this purpose of the analyses was to apply the theoretical concepts of traffic segmentation to a selected number of industries, no attempt was made to cover all rail users in a systematic sampling fashion. Instead, the analysis focused on three major industries: grains, coal, and ores.

Within each of these industry groups, an attempt was made to identify those companies that have been actively involved in transportation policy for their respective trade associations. In each case, the person contacted represented the principal official responsible for making transportation decisions. The interviews were specifically tailored to each of the industries using the understanding gained from the review of secondary information. For this reason, a specific set of questions were developed for the discussions within each industry.

Broken down on an industry basis, the following number of interviews were conducted:

- Grains and Oilseeds (10)
- Grain milling and oilseed processing products (9)
- Meat and meat by-products (3)
- Canned fruits and vegetables (5)
- Sugar (3)
- Coal (6)
- Iron ore (3)
- Steel products (5)
- Iron and steel scrap (3)

- Cement, sand, and gravel (2)
- Forest products*

The interviews were used to develop specific transportations related information. This included the identification of unique transportation characteristics, distribution methods, trends in modal choice, apparent transportation alternatives, and transportation practices and policies relating to the use of rail, carriers.

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* Shipper interviews were not conducted for forest products.

INTERSTATE COMMERCE COMMISSION

SPC COMMODITY GROUPS

SPC Commodity Group Number	Description
1	Cotton
2	Wheat
3	Corn and Sorghum Grains
4	Barley
5	Grain, All Other
6	Soybeans
7	Rice
8	Potatoes, Other Than Sweet
9	Sugar Beets
10	Citrus Fruits
11	Apples
12	Deciduous Fruits
13	Fresh Vegetables
14	Melons
15	Iron Ore
16	Non-Ferrous Concentrates
17	Calcined or Activated Bauxite Ores
18	Anthracite Coal
19	Prepared Bituminous Coal for Metallurgical or Coking Purposes
20	Prepared Bituminous Coal for Fuel or Steam Purposes
21	Lignite, Prepared or Raw
22	Fluxing Limestone & Dolomite
23	Construction Aggregates
24	Industrial Sand
25	Clays, Dry, Other Than Fire Clay
26	Feldspar
27	Potash Fertilizers
28	Phosphate Rock
29	Fresh Meats and Packinghouse Products
30	Canned and Preserved Fruits and Vegetables
31	Other Foodstuffs, Canned, Preserved or Prepared
32	Frozen Fruits and Vegetables
33	Wheat Flour Milling Products
34	Dry Corn Milling Products
35	Other Grain Mill Products

SPC Commodity Group Number	Description
36	Wet Corn Milling Products
37	Cereal Preparations (Cooked)
38	Sugar, Refined, Cane or Beet
39	Malt Liquors
40	Wines and Brandy
41	Alcoholic Liquors
42	Commercial Fats and Oils
43	Seed, Nut or Vegetable Cake or Meal
44	Cigars, Cigarettes, and Manufactured Tobacco
45	Textile Products
46	Pulpwood Logs
47	Pulpwood Chips
48	Lumber
49	Treated Wood Products
50	Wood Posts, Poles or Piling
51	Millwork and Other Lumber Products
52	Plywood or Veneer
53	Hardwood Dimension Stock and Flooring
54	Wood Particle Board
55	Furniture
56	Woodpulp and Other Pulps
57	Newsprint Paper
58	Ground Wood Paper
59	Printing Paper
60	Wrapping Paper and Paper Bags
61	Pulpboard, Other Than Corrugated
62	Pulpboard, Corrugated
63	Sanitary Paper Products
64	Paperboard Boxes or Containers
65	Food Containers and Fibre Cans, Drums or Tubes
66	Building Paper and Building Board
67	Industrial Inorganic Chemicals
68	Barium or Calcium Compounds
69	Sodium Alkalies
70	Soda Ash
71	Industrial Gases
72	Industrial Organic Chemicals
73	Sulphuric Acid
74	Anhydrous Ammonia
75	Superphosphate

SPC Commodity Group Number	Description
76	Agricultural Chemicals, including Fertilizers
77	Plastic Materials
78	Rubber, Natural and Synthetic
79	Detergents and Other Cleaning Preparations
80	Salt, Rock and Common
81	Carbon Blacks
82	Petroléum Refining Products
83	Petroleum, Lubricating Oils and Greases
84	Asphalt Pitches or Tars
85	Liquified Gases, Coal or Petroleum
86	Construction Materials, Asphalt or Asbestos
87	Petroleum Coke
88	Coke Produced from Coal
89	Tires and Tubes, Rubber
90	Plastic Products
91	Glass Containers
92	Hydraulic Cement
93	Brick or Blocks, Clay or Shale
94	Clay Refractories
95	Lime
96	Gypsum Building Materials
97	Mineral Wool
98	Pig Iron
99	Semi-Finished Steel
100	Manufactured Iron or Steel
101	Iron or Steel Pipe, Tubes or Fittings
102	Railway Track Material
103	Ferroalloys
104	Primary Copper Products
105	Primary Zinc Products
106	Primary Aluminum Products
107	Brass, Bronze or Copper Basic Shapes
108	Aluminum Basic Shapes
109	Metal Containers
110	Farm Machinery
111	Heavy Machinery
112	Major Household Appliances
113	Household Radios or Television Sets
114	Motor Passengers Cars, Assembled
115	Motor Vehicles, Assembled (Other Than Passenger Cars)

PC Commodity roup Number	Description
116	Motor Vehicle Parts
117	Locomotive or Railway Car Parts
118	Iron or Steel Scrap
119	Non-Ferrous Metal Scrap
120	Textile Waste or Scrap
121	Paper Waste or Scrap
122	Chemical or Petroleum Waste
123	Shipping Containers or Devices, Returned Empty
124	Freight Forwarder Traffic
125	Shipper Association Traffic
126	Miscellaneous Mixed Shipments
127	All Other

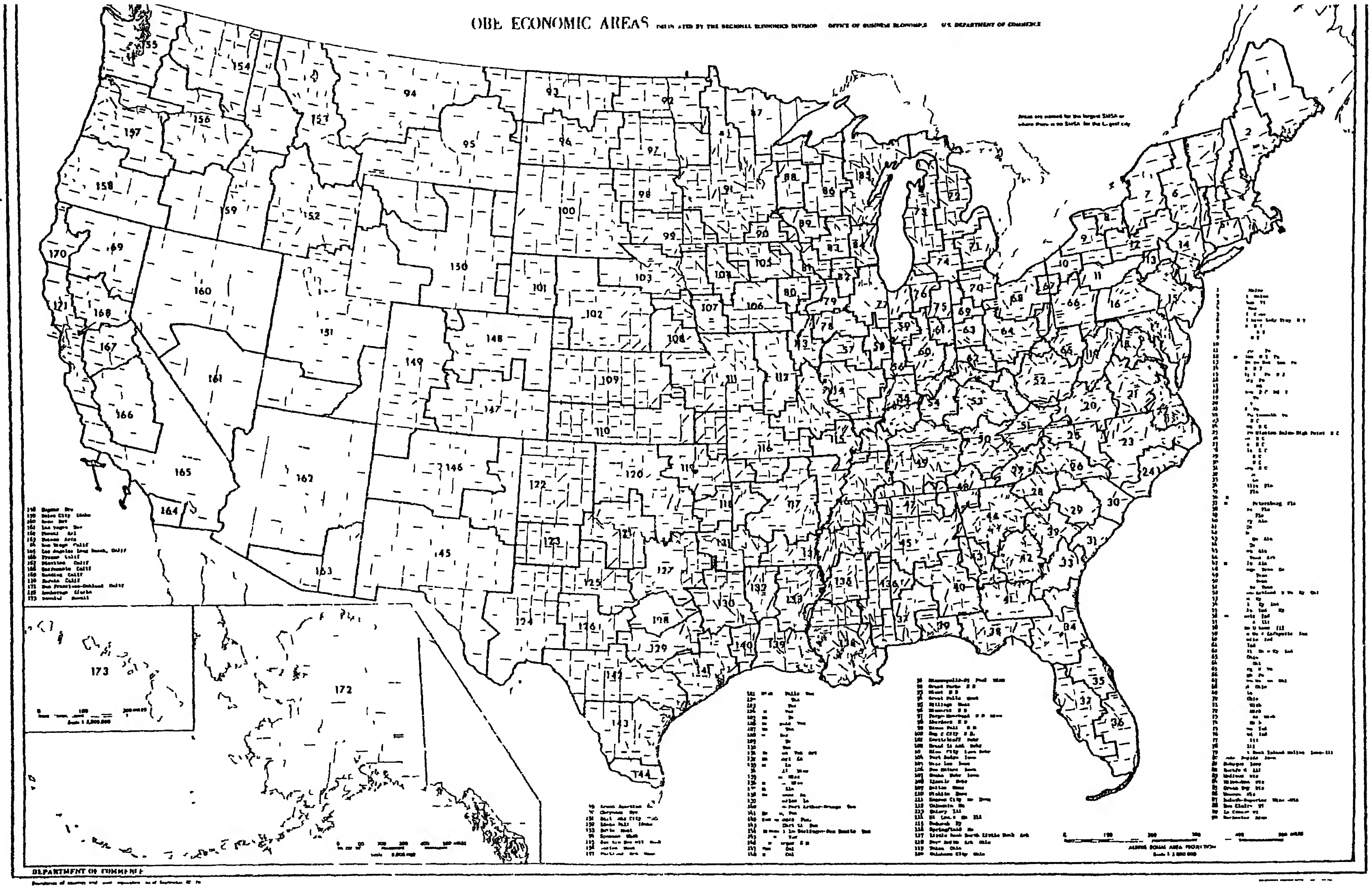
OBE ECONOMIC AREAS
DEPARTMENT OF COMMERCE

EXHIBIT IV-3

ESTIMATED VALUES PER TON BY SPC COMMODITY GROUP AS EMPLOYED IN THE RATE/SERVICE DIFFERENTIAL TEST

SPC	VALUE PER TON	SPC	VALUE PER TON	SPC	VALUE PER TON
1	$1,350.39	43	$ 191.94	85	$ 350.00
2	78.85	44	6,500.00	86	300.00
3	66.85	45	3,294.42	87	100.00
4	78.57	46	15.00	88	84.01
5	84.28	47	17.00	89	1,255.09
6	113.05	48	173.00	90	1,468.53
7	142.40	49	166.97	91	298.00
8	86.97	50	140.00	92	31.88
9	14.67	51	277.67	93	35.00
10	75.36	52	277.67	94	35.00
11	127.50	53	156.19	95	25.94
12	101.43	54	191.14	96	200.00
13	118.73	55	1,368.80	97	500.00
14	56.67	56	361.05	98	187.05
15	23.04	57	540.70	99	229.61
16	1,472.54	58	540.70	100	371.57
17	24.96	59	540.70	101	579.78
18	34.15	60	540.70	102	303.36
19	41.68	61	540.70	103	350.00
20	18.82	62	835.65	104	1,322.99
21	19.00	63	495.00	105	693.14
22	2.48	64	371.23	106	1,023.29
23	1.67	65	571.23	107	1,443.10
24	1.67	66	180.35	108	1,579.29
25	8.26	67	589.06	109	2,000.00
26	16.50	68	272.28	110	1,694.51
27	45.97	69	177.84	111	1,694.51
28	17.71	70	70.40	112	1,306.26
29	1,364.86	71	146.09	113	1,306.26
30	609.88	72	309.56	114	4,700.00
31	562.98	73	49.50	115	8,377.70
32	516.68	74	161.43	116	4,000.00
33	153.54	75	215.54	117	4,000.00
34	190.33	76	147.58	118	59.31
35	178.09	77	731.48	119	175.00
36	165.84	78	683.82	120	50.00
37	1,412.53	79	765.47	121	50.00
38	433.91	80	12.86	122	314.71
39	308.51	81	300.00	123	40.00
40	344.26	82	600.00	124	700.00
41	577.68	83	600.00	125	700.00
42	274.53	84	300.00	126	700.00
				127	300.00

Estimated Values as of Mid 1977.

V - RESULTS OF STATISTICAL ANALYSIS

The application of the statistical analysis described in Chapter IV lays a solid foundation for designing and evaluating alternative methods to implement the concept of market dominance. This chapter contains the details of the statistical methodology and analysis conducted in this study.

This discussion is organized into ten major sections as listed below:

- Overview of Analysis
- Rail Traffic Characteristics
- Results of Individual Tests
- Cell Structure
- Cell Level Statistics
- SPC Level Statistics
- Sample Level Statistics
- Identifying the Competitive Traffic
- Special Analyses
- Further Examination of Motor Carrier Competition

OVERVIEW OF ANALYSIS

The research undertaken in this project was an experimental effort to develop data that would support new alternatives and procedures for implementing market dominance. The research approach was continually revised to reflect insights gained as the study progressed. Some approaches which held promise at first (and which were often in accord with popular notions of how rail regulation should be structured) did not yield equally successful results. However even these results have yielded highly useful information as is explained in Chapter VII. Because the results were useful, whether positive or negative, this chapter discusses the entire statistical analysis including these efforts which were not entirely successful in terms of their original objectives. The final results for all the commodities are presented in a number of appendices in a separate volume. In this chapter, five commodities, wheat, fresh vegetables, furnitures, organic chemicals and manufactured iron and steel, are repeatedly used for illustrating the functions and output format of the analyses. These commodities were selected for the diversity of their traffic characteristics. Throughout the analyses, they are also found to possess distributional characteristics similar to those of the entire sample.

The statistical analysis was conducted in four overlapping phases. The first phase identified significant characteristics of rail traffic and analyzed them in some detail in order to better understand their complexities. The results of this investigation are presented in the next section. Once the general characteristics of the rail traffic had been analyzed, a large number of specific tests were performed on the data. Some were intended to identify competitiveness (or the lack thereof) in transportation markets. Others were intended to address a variety of serious implementation issues regarding new procedures. These tests and their results are presented in the third section of this chapter.

The eight tests presented in Chapter IV were applied to the data base to develop a methodology for combining individual tests into composite measures of transportation market competitiveness. During the construction of the scoring system for measuring relative non-competitiveness, each test was examined to see whether it was consistent with the scoring system or not. The outcome of the examination is that only the following single tests and their combinations formed a valid scoring system.

- Transportation Rate Differential Test
- Rate/Service Differential Test
- Intramodal Competition Test

Much was learned from this analysis about the mutual interaction among the tests. This process and the specific results are described in detail under the heading entitled Cell Structure

The process to combine tests suggested that the tests for motor carrier competition in markets served by rail are very important in developing alternative procedural designs. Consequently, the statistical research concluded with a more sophisticated analysis to determine the scope and characteristics of motor carrier competition. The results are presented at the end of the Chapter. A summary section concludes the chapter.

RAIL TRAFFIC CHARACTERISTICS

A systematic group of descriptive statistical analyses were performed on important dimensions of commodity movements in order to determine the characteristics of rail traffic. Miles per movement, tons per carload, revenue per carload, and average carloads per waybill were among the most significant elements examined for each SPC commodity grouping. Total revenue, tons, and carloads for each SPC were also compiled from the specially processed One Percent Waybill Sample for 1977 (refer to Chapter IV for a discussion of the characteristics of the data base). As expected, the statistical results show the traffic characteristics composition to be complicated and far from homogeneous. Many of the empirical analyses in the ensuing sections are done on an aggregate level to examine average trends and thus do not reflect the same amount of complexity and diversity of the actual traffic base. The following paragraphs and tables briefly present the descriptive statistical results.

(a) Traffic Volumes by SPC

The total sample tonnage, revenue, and carloads were determined for each SPC to determine the relative importance of each commodity. Table V-1 lists the 10 commodity groups with the greatest revenue, followed by Table V-2, listing the 10 commodity groups with the least. Complete statistics for all SPC

Table V-1

Ten Highest Volume SPC Groups (by revenue): Revenue, Tons, and Carloads in Specially Processed One Percent Waybill Sample

SPC Description	Revenue ($000's)	% of Total	Tons (000's)	% of Total Tons	Carloads	% of Total Carloads
20 Steam bit. coal	$13,518	10.1%	2,123	22.7%	24,560	16.6%
116 Motor Veh. parts	6,676	5.0	132	1.4	5,480	3.7
2 Wheat	4,181	3.1	362	3.9	3,953	2.7
48 Lumber	3,999	3.0	133	1.4	2,786	1.8
114 Automobiles	3,835	2.9	46	0.5	1,907	1.3
3 Corn and Sorghum	3,564	2.7	360	3.9	4,084	2.8
72 Ind. Org. Chemicals	3,295	2.5	143	1.5	1,852	1.3
61 Pulpboard	3,275	2.5	171	1.9	3,137	2.1
100 Mfd. Iron or Steel	2,843	2.1	173	1.9	2,607	1.8
31 Other Canned Foods	2,810	2.1	106	1.1	2,416	1.6
Total for Ten SPC Groups	$47,996	36.0%	3,749	40.2%	52,782	35.7%
Total for Nine SPC's (less coal)	$34,478	25.9%	1,626	17.4%	28,222	19.1%

Source: A. T. Kearney, Inc., analysis of 1977 Waybill Sample, excluding TOFC/COFC. Exhibit V-1.

Table V-2

Ten Lowest Volume SPC Groups (by revenue): Revenue, Tons, and Carloads in Specially Processed One Percent Waybill Sample

SPC Description	Revenue ($000's)	% of Total	Tons (000's)	% of Total Tons	Carloads	% of Total Carloads
53 Hardwood Stock	$ 43	.032%	1.5	.016%	32	.022%
107 Copper Shapes	66	.050	1.9	.020	29	.019
11 Apples	68	.051	.8	.009	20	.013
122 Chemical Waste	76	.057	4.6	.049	66	.045
105 Prim. Zinc Prod	76	.057	2.6	.028	40	.027
26 Feldspar	84	.063	3.9	.042	52	.035
12 Deciduous Fruits	91	.068	1.0	.011	29	.019
14 Melons	100	.075	1.2	.013	35	.024
21 Lignite	106	.080	30.1	.323	338	.228
98 Pig Iron	109	.082	8.0	.086	103	.070
Total for Ten SPC Groups	$819	0.615%	55.5	.595%	744	.502%

Source: A. T. Kearney, Inc., analysis of 1977 Waybill Sample, excluding TOFC/COFC. Exhibit V-1.

groups are presented in Exhibit V-1 at the end of this Chapter. Additional statistics covering the mean and standard deviation by SPC for such values as tons per carload and revenue per carload are presented in Appendix B which appears in the separate volume of statistical appendices.

The tables illustrate the great diversity of rail traffic. Out of 127 SPC commodity groups, only three commodities individually represent more than 3% of the total revenue in the sample. Only SPC 20, Steam Bituminous Coal, has over 10% of total revenue in the sample. Note that both bulk and manufactured commodities appear in each table. While it is true that the overwhelming majority of rail tonnage is bulk commodities, manufactured goods are of major importance when revenue is considered. A comparison of the percentages of total revenue, tons, and carloads for the various commodities in Tables V-1 and V-2 will indicate why this is so, as illustrated when coal is omitted from the totals in Table V-1.

(b) Other Traffic Characteristics

The diversity of commodity types (which vary widely in terms of revenue importance) is paralleled by the dispersed characteristics of individual movements within commodity groups. Perhaps the best illustration of this is the length of haul per movement. Many commodities are often thought of as "short haul", such as construction aggregates, or "long haul", such as plywood. In general, these descriptions are correct; however, a detailed look at the statistics of the length of haul reveals a more complex picture. This is illustrated by the examples in Table V-3 on the following page.

Table V-3

Length of Haul Statistics for Selected SPC Commodity Groups

SPC	Description	Mean Length of Haul (miles)	Standard Deviation	Maximum Mileage in Sample	Minimum Mileage in Sample
2	Wheat	388	293	1,639	5
10	Citrus Fruit	2,842	345	3,181	1,459
15	Iron Ore	221	176	2,017	14
23	Const. Aggregates	201	215	2,606	4
32	Frozen Fruit & Veg.	1,625	877	3,226	9
52	Plywood	1,370	995	3,508	21
100	Mfd. Iron or Steel	453	455	3,094	4
	ALL TRAFFIC IN SAMPLE	569	591	3,599	1

Source: A. T. Kearney, Inc. analysis, 1977 One Percent Waybill Sample, excluding TOFC/COFC. Appendix B.

This broad dispersion is also evident in Exhibit V-2, which presents the full list of SPC commodity groups and the mileage statistics for each.

Virtually every traffic characteristic examined in this way produced a highly broad dispersion of values, although mean values tended to be "reasonable." For example, the mean tons per carload for SPC 3, Corn, was 88.3, the standard deviation 17.9, and the range 10 to 150 tons. Similar results were found for revenue per carload as might be expected from the wide mileage distribution. Appendix B (in the separate volume of statistical appendices) contains a complete listing of results for all SPC commodity groups.

Based on this fairly comprehensive understanding of the traffic being studied, the research effort moved to develop tests for traffic competitiveness and related issues. The results of this aspect of the analysis are presented in the following section.

RESULTS OF INDIVIDUAL TESTS

As was explained in Chapter IV, six tests were applied to individual movements on the One Percent Waybill Sample in an effort to identify the presence (or absence) of competition. The initial concept of the study believed that identifying non-competitive (market dominant) traffic would be most useful for regulatory design purposes, each test was structured to reflect the absence of competition as a "hit" or "pass." In addition to these six individual tests, numerous combination tests were designed. Each of the six basic tests is discussed in the following subsections. At the end of this section is a brief discussion of the joint or combination tests.

(a) Transportation Rate Differential Test

The motor carrier costing model described in Chapter IV and in Appendix A, was employed to develop simulated shipper cost for truck service for each movement in the Waybill Sample. In this test, the shipper's cost for the lowest cost form of motor carrier service was compared against the rail revenue for the movement. (When rail revenue was below the Rail Form A fully allocated cost, fully allocated cost was used instead.) Since this test compares truck to rail directly no service differential was considered. Movements which had truck cost higher than

rail were defined in terms of this test as less-competitive, although service differentials could still make truck competitive. During the development of the motor carrier cost model a high range and a low range cost were developed, both were applied to the Waybill Sample. Results of both are presented in this discussion.

Table V-4 presents the mean and standard deviation of the ratios for all carloads within each of five selected SPC commodity groups and for the total. A complete listing of all SPC groups is given in Exhibit V-3. The mean values given are weighted by carloads. Given the rather widely dispersed mileages, there was substantial variability among the ratios within each SPC group.

The magnitudes in Table V-4 suggest that within each SPC there is a mix of direct competitive and less-competitive traffic as measured by this test. Table V-4 also gives the percent which "passed" the test (i.e. the truck cost to shippers was above rail) for the same five SPC groups and total rail traffic.

Based on Table V-4, depending on the assumptions made in applying motor carrier costs, approximately 20% to 40% of rail traffic other than TOFC/COFC might be considered directly truck competitive in terms of the motor carrier service cost to the shippers at or below rail rates. The percentages of carloads passing this rate differential test are given for all SPC commodity groups in Exhibit V-4.

Table V-4

Truck Rail Ratio and Estimated Percent of
Carloads Passing The Transportation
Rate Differential Test (Less Competitive)

SPC DESCRIPTION	HIGH TRUCK COST ESTIMATES			LOW TRUCK COST ESTIMATES		
	Mean Truck/Rail Ratio	Standard Deviation of Ratio	% of Carloads Passing the Test	Mean Truck/Rail Ratio	Standard Deviation of Ratio	% of Carloads Passing the Test
2 Wheat	2.13	0.85	74.6	1.39	0.62	54.5
13 Fresh Vegetables	0.95	0.19	29.6	0.86	0.16	10.2
55 Furniture	1.75	0.73	87.9	1.26	0.54	62.8
75 Organic Chemicals	2.38	0.95	79.8	1.76	0.67	63.9
100 Iron & Steel Products	1.28	0.51	30.2	1.01	0.41	16.3
ALL TRAFFIC IN SAMPLE	2.49	2.43	81.3	1.52	1.45	61.4

SOURCE: A. T. Kearney, Inc. analysis of 1766 One Percent Waybill Sample, excluding TOFC/COFC. Exhibit V-3.

(b) Rate/Service Differential Test

The Transportation Rate Differential Test does not recognize the willingness of shippers to pay motor carrier rates above rail rates in order to obtain superior service. The Rate /Service Differential Test was therefore developed as a proxy measure for recognizing shipper service sensitivity. In this test, a rail movement is only ranked as non-competitive if a shift to motor carrier would result in more than a 5% increase in the delivered price of the goods (3% for homogeneous bulk commodities such as sand, salt, coal, etc.). The details of the test procedure itself are explained in Chapter IV.

Less non-competitive traffic was found with this test than with the simple rate differential test. The mean percentage increase in the delivered price for all carloads in the sample was only 33% based on the high truck cost estimated, and 12% based on the low truck cost estimate. Manufactured commodities tended to have mean percentage increases of 10% and 2% respectively (Statistics for all SPC commodities may be found in Appendix B, contained in a separate volume.) Table V-6 gives the percent of carloads found non-competitive in terms of this test for five selected SPC commodity groups. Both the high and low truck cost estimates are given. These values are directly comparable to those in Table V-5 on the following page.

(c) Market Share Trend Analysis

This test was designed to capture, the longer range effects of physical distribution decisions that have shifted much high valued traffic to motor carriers in the last decades. Application of this test involved analysis of the Commodity Transportation Survey data for 1972 and 1967. For most non-bulk traffic it was possible to observe the shift in rail market share from 1967 to 1972. By this test, a movement was judged noncompetitive if it was part of a traffic segment where the rail share remained constant or increased over the 5 year period. For bulks and agricultural traffic, an approximation of the trend had to be developed based on growth rates of the tonnage, as explained in Chapter IV.

Table V-5

Rate/Service Differential Test:
Estimated Percent of Total Carloads
Passing the Test (Less Competitive) for Five Selected SPC's

: Description	High Truck Cost Estimates	Low Truck Cost Estimate
Wheat	74.1%	54.3%
Fresh Vegetables	28.5	13.0
Furniture	34.4	7.7
Organic Chemicals	47.4	28.4
Iron and Steel Prod.	3.3	1.3
ALL TRAFFIC IN SAMPLE	62.5	48.6

ırce: A. T. Kearney, Inc. analysis, 1977 One Percent Waybill Sample, excluding TOFC/COFC. Exhibit V-4

Results for the five illustrative commodities are presented in Table V-6. Again, the percentages given indicate the proportion of the carloads which would be considered non-competitive by this test.

When this service component is included in this test of rail/truck competitiveness between 40% and 50% of revenue carloads (other than TOFC/COFC) could be considered competitive (50% to 60% non-competitive). The percentages of carloads passing this delivered price increase test ("passing" meaning non-competitive) are given for all SPC commodity groups in Exhibit V-4.

The values for Wheat and Fresh Vegetables must be interpreted with care since they were derived by a different procedure than the manufactured goods. Nonetheless, they are representative of the somewhat higher values which were found for bulks and agricultural commodities. The very low values for the other three SPC's shown in Table V-7 are typical of values for all manufactured commodities, only three of which exceeded 10% of the commodity. Exhibit V-4 contains a complete listing of percentages for all SPC commodity groups.

Table V-6

Market Share Trend Text:
Estimated Percent of Carloads
Passing the Test (Less Competitive)
for Five Selected SPC's

SPC Description		Percent of Total Carloads
2	Wheat	40.1%
13	Fresh Vegetables	7.1
55	Furniture	0.8
72	Organic Chemicals	2.7
100	Iron and Steel Products	1.3
	ALL TRAFFIC IN SAMPLE	5.6

Source: A. T. Kearney, Inc. analysis of specially processed One Percent Waybill Sample for 1977 (with TOFC/COFC deleted) and the Commodity Transportation Surveys for 1967 and 1972.

Exhibit V-4

(d) Intramodal Competition Test

There is clearly some competition between carriers even though railroads have a mechanism for setting rates collectively. If railroad rate bureaus were weakened or eliminated, (both the Department of Transportation and the Commission discourage collective ratemaking and are attempting to reduce the role of rate bureaus) intramodal competition might become a stronger competitive force. An intramodal competition test was therefore developed to estimate the potential for this form of competition given the current patterns of traffic share for major rail movements. As with the other tests, details are presented in Chapter IV.

Intramodal competition may be characterized in three ways based on the fact that 65% or more of all rail traffic is interchanged. A test may focus strictly on the traffic share of the originating carrier, of the terminating carrier, or of combinations of originating and terminating carriers. Thus, this test was applied in these three ways. The differences, although conceptually interesting, proved to be less significant in practice as shown in Table V-7, below.

Table V-7

Intramodal Competition Test:
Estimated Percent of Total Carloads
Passing the Test (Less Competitive)
for Five Selected SPC's

SPC Code	Description	Origin Carrier Competition	Carrier Competition	Route Competitio
2	Wheat	8.7%	10.0%	11.5%
13	Fresh Vegetables	27.7	29.3	31.2
55	Furniture	53.0	48.9	59.4
72	Organic Chemicals	30.9	31.7	37.2
100	Iron & Steel Products	24.7	26.7	34.5
	All Carloads in Sample	22.5	21.9	26.0

Source: A. T. Kearney, Inc. analysis 1977
One Percent Waybill Sample, excluding TOFC/COFC.

Exhibit V-4.

To the extent the test methodology produces an accurate portrayal of potential intramodal competition, it would appear that from 75% to 80% of rail carloads (other than TOFC/COFC) might become competitive given a change in institutional arrangements. As will be discussed in Chapter VII, however, these values appear to be significantly overstated.[1]

(e) Stability Test

In the discussion of theoretical issues presented in Chapter III, it was argued that highly stable short run patterns of traffic flow may indicate the absence of active market competition. Thus, a test for short run demand stability was created, based on data developed in Kearney's analysis of the Section 202 ratemaking provisions for the Commission. The results for the five example SPC's are detailed in Table V-8.

Table V-8

Stability Test:
Estimated Percent of Total Carloads Passing the Test (Less Competitive) for Five Selected SPC's

SPC Code	Description	Percent of Total Carloads
2	Wheat	0.0
13	Fresh Vegetables	0.0
55	Furniture	0.0
72	Organic Chemicals	75.4
100	Iron & Steel Products	67.1
	All Carloads in Sample	29.4

Source: A. T. Kearney, Inc. analysis, 1977.
One Percent Waybill Sample, excluding TOFC/COFC.

Exhibit V-4

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1 A study performed by Princeton University for The Rail Services Planning Office indicated only 25% of rail market peers (defined at the six digit SPLC level) are served by significantly competitive railroads. The Princeton definition of a "market" is considerably narrower than that used in this study and supports the reservation. See Analysis of The Flow of Freight Traffic on the U.S. Railroad System for the Year 1974, Final Report June 1978. RSPO Contract DP 77--7916.

The zero percentage for Wheat and Fresh Vegetables is primarily the result of their highly seasonal nature. Furniture possess some seasonal characteristics also because of the purchasing patterns of households and the construction seasons. Industrial Organic Chemicals and Iron and Steel Products, like most other manufactured goods in the Sample, appear to have a high proportion of stable traffic. The complete list of SPC commodity groups and the percent of carloads passing this test are given in Exhibit V-4.

(f) Revenue/Variable Cost Ratio Test

The revenue/variable cost ratio test has frequently been used as an indicator of the exercise of rail market power. Consequently, special attention was devoted to applying this test to traffic in the Waybill Sample. The special problems associated with Rail Form A costing and its relation to the full economic costs of providing a specific service are discussed in detail in Chapter IV. Recognizing those problems, it was felt necessary to apply this test over a range of values so as to identify the sensitivity of the test to selection of a threshold ratio. Thus, the analysis was run with 1.3, 1.4, 1.5, 1.6, 1.7, and 1.8 ratios each as the threshold of "non-competitiveness."

The anomalies in the Rail Form A Costing methodology, when coupled with the eccentricities of railroad rate structures, yield results which are meaningful at the aggregated level, but which are difficult to interpret for the individual movements that are usually at issue in an individual market dominance proceeding. In Table V-9, on the following page, the mean of ratios and standard deviation of the ratios are shown for the five example commodities. The complete list of SPC commodity groups is presented in Exhibit V-5. It should be noted that the resulting variable revenue/cost ratios in this study may differ from the ones derived from a previous study on the potential impacts of Section 202 ratemaking provisions.[2] The difference may be

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2 Interstate Commerce Commission, The Impact of the 4-R Act Railroad Ratemaking Provisions, Washington, D. C., ICC, October 1977.

due to the new data base used for this study (1978 Waybill vs. 1977 Waybill) and the fact that in the prior study a significant test was employed to select revenue/variable cost ratios, in effect, discarding the outliers. In the present study, it is felt all information should be kept since the statistical analyses are focused on the movement or the record level, and no outliers are detected through a significant test.

Table V-9

Revenue/Cost Ratio Statistics for Five Selected SPC's

SPC Code	Description	Mean of Ratios	Standard Deviation of Ratios
2	Wheat	1.58%	0.77%
13	Fresh Vegetables	1.04%	0.33%
55	Furniture	1.18%	0.42%
72	Organic Chemicals	1.78%	0.82%
100	Iron & Steel Products	1.76%	0.58%
	ALL CARLOADS IN SAMPLE	1.38%	1.17%

Source: A. T. Kearney, Inc. analysis, 1977.
One Percent Waybill Sample, excluding TOFC/COFC.

Exhibit V-5

The mean values given are generally consistent with those developed in the study of the Section 202 ratemaking provisions and appear to reflect somewhat general carrier opinions regarding rates. The standard deviations, on the other hand, show a fairly broad dispersion of ratios at the individual carload level. This is confirmed by the large range of the ratios (shown in the summaries in Appendix B). Thus, data based on evaluation of revenue/cost ratios for individual movements may be difficult to interpret. This should be borne in mind when the results of the revenue/cost ratio test are being considered.

The estimated percentages of non-competitive carloads using the revenue/cost ratio test appear for the five example commodities in Table V-10, as shown below.

Table V-10

Revenue/Cost Ratio Test:
Estimated Percent of Total Carloads
Passing the Test (Less Competitive)
for Five Selected SPC's

SPC	Description	1.3 Ratio Test	1.4 Ratio Test	1.5 Ratio Test	1.6 Ratio Test	1.7 Ratio Test	1.8 Ratio Test
2	Wheat	59.3%	54.1%	48.3%	42.6%	38.5%	35.2%
13	Fresh Vegetables	2.8	1.2	1.2	0.4	0.4	0.4
55	Furniture	29.4	21.7	14.3	9.0	5.6	3.3
72	Organic Chemicals	71.1	64.2	57.0	50.6	44.8	38.8
100	Iron & Steel Products	78.4	72.1	65.6	58.1	50.2	42.3
	ALL CARLOADS IN SAMPLE	47.7	40.0	32.8	26.8	21.7	17.6

Source: A. T. Kearney, Inc. analysis 1977 One Percent Waybill Sample, excluding TOFC/COFC.

Exhibit V-6

The rapid drop in the percentages as the ratio threshold approaches 1.8 suggests that ratios above this level would result in even smaller percentages. At the low end, since the average for all carloads in the sample is 1.38, 1.30 would appear to be a reasonable lower bound. The five example commodities are relatively typical of all SPC commodity groups, data for which are presented in Exhibit V-6. Other data regarding the revenue/cost ratio test including statistics regarding revenue and variable cost per carload are contained in Appendix B.

Table V-11 on the following page shows the summary statistics on the percentages at the carloads passing each of the individual tests with high and low truck cost estimates discussed in this section.

Table V-11

Estimated Percent of Carloads Passing the Individual Tests (Less Competitive)

SPC Description	Transportation Rate Differential Test	Rate/Service Differential Test	Market Share Trend Test	Intramodal Competition Test	Stability Test	Revenue/Cost Test 1.3 Ratio	Revenue/Cost Test 1.8 Ratio
High Truck Cost Estimates							
2 Wheat	74.6%	74.1%	40.1%	11.5%	0.0%	59.3%	35.2%
13 Fresh Vegetables	29.6	28.5	7.1	31.2	0.0	2.8	0.4
55 Furnitures	87.9	34.4	0.8	59.4	0.0	29.4	3.3
72 Organic Chemicals	79.8	47.4	2.7	37.2	75.4	71.1	38.8
100 Iron & Steel Products	30.1	3.3	1.3	34.5	67.1	78.4	42.3
ALL TRAFFIC IN SAMPLE	81.3	62.5	5.6	26.0	29.4	47.7	17.6
Low Truck Cost Estimates							
2 Wheat	54.5%	54.3%	40.1%	11.5%	0.0%	53.9%	22.2%
13 Fresh Vegetables	10.3	13.0	7.1	31.2	0.0	3.2	0.4
55 Furnitures	62.8	7.7	0.8	59.4	0.0	28.9	2.9
72 Organic Chemicals	63.9	28.4	2.7	37.2	75.4	70.1	37.6
100 Iron & Steel Products	16.3	1.3	1.3	34.5	67.1	77.1	41.0
ALL TRAFFIC IN SAMPLE	61.4	48.6	5.6	26.0	29.4	45.1	15.8

Source: Tables V-4 to V-10; Exhibit V-6

COMBINATION TESTS

If the occurrence of one test for non-competitiveness is not related to the occurrence of all the rest, then each possible form of market power measure must be examined before conclusions can be drawn. Consequently, several joint and combination tests were developed and applied to the data as one approach to identifying both the non-competitive traffic and the competitive traffic.

In this section five simple test combinations are presented. No inferences were made regarding the mutual interaction among the tests or their degree of dependency. In the next major section, dealing with a "competitiveness" scoring system, there is a comprehensive discussion of the statistical measures of interaction among the tests.

Two approaches to combining tests are relevant. First, if non-competitiveness is to be found, a "both-and" condition between the tests must be present. That is (in the absence of data on the quality or validity of individual tests), non-competitiveness is most fully determined where there is no motor carrier competition, no intramodal competition, and the rail rate is high relative to costs. Secondly, when competitiveness is measured, a movement may be considered competitive even if only one measure of competition is present. Thus, in combining individual tests to find competitiveness, an "either-or" condition must be met. Each of these approaches were employed in the analysis and are reported below. The two approaches are discussed in the following sections (a) and (b), respectively.

(a) Combination Tests For Non-Competitiveness

A movement in the sample was considered non-competitive if it:

- had a simulated motor carrier rate in excess of the rail rate
- was non-competitive by the intramodal competition test
- had a revenue/variable cost ratio above a specified level.

Since there are uncertainties regarding the selection of revenue/ cost ratios, all six (1.3, 1.4, 1.5, 1.6, 1.7 and 1.8) were employed. The tests were also run using both high range and low range motor carrier cost estimates.

Tables V-12 and V-13, on the following pages, present the percentage of carloads found to be non-competitive in terms of this combination test for the five example SPC's. These percentages may be compared directly with the tables in the preceding section.

Since this test applies a "both-and" criteria, it is not surprising that the percentages found non-competitive are substantially below those for individual tests. The implication of this is, of course, that the occurrence of any one test is not necessarily linked to the occurrence of the others. This issue is explored more rigorously in the next section. While not all SPC's displayed percentages as low as those for the 5 examples, all were substantially lower than with other tests; only two in fact exceeded 50% even at the 1.3 level of revenue/cost ratio. For reference purposes, Exhibits V-7 and V-8 contain the complete listing of SPC values for both truck cost estimate levels.

Table V-12

First Combination Test for Non-Competitiveness:
Percent of Carloads for Five Selected SPC's[1]
High Range Motor Carrier Costs

SPC	Description	% of Carloads Over 1.3 R/C Ratio	% of Carloads Over 1.4 R/C Ratio	% of Carloads Over 1.5 R/C Ratio	% of Carloads Over 1.6 R/C Ratio	% of Carloads Over 1.7 R/C Ratio	% of Carloads Over 1.8 R/C Ratio
2	Wheat	4.9%	4.3%	3.4%	2.9%	2.5%	2.2%
13	Fresh Vegetables	0.4	0.4	0.4	0.0	0.0	0.0
55	Furniture	15.1	10.8	7.4	4.5	2.6	1.4
72	Organic Chemicals	20.8	19.2	16.5	14.5	12.5	11.0
100	Iron & Steel Products	11.1	9.8	8.4	6.9	5.3	4.1
	ALL CARLOADS IN SAMPLE	10.9	9.0	7.1	5.7	4.5	3.5

Source: A. T. Kearney, Inc. analysis, 1977.
One Percent Waybill Sample, excluding TOFC/COFC.
Exhibit V-7.

1 The combination test is for carloads passing all the following tests:

- Transporation Rate Differential Test
- Intramodal Competition Test
- Revenue/Variable Cost Test (One of the ratios)

First Combination Test for Non-Competitiveness:
Percent of Carloads for Five Selected SPC's[1]
Low Range Motor Carrier Costs

SPC	Description	% of Carloads Over 1.3 R/C Ratio	% of Carloads Over 1.4 R/C Ratio	% of Carloads Over 1.5 R/C Ratio	% of Carloads Over 1.6 R/C Ratio	% of Carloads Over 1.7 R/C Ratio	% of Carloads Over 1.8 R/C Ratio
2	Wheat	2.63%	2.13%	1.54%	1.04%	0.91%	0.66%
13	Fresh Vegetables	0.79	0.40	0.40	0.00	0.00	0.00
55	Furniture	9.46	6.33	4.04	2.14	1.14	0.61
72	Organic Chemicals	14.79	13.17	11.07	9.02	7.83	6.53
100	Iron & Steel Products	5.26	4.49	3.61	2.80	1.84	1.23
	ALL CARLOADS IN SAMPLE	7.35	5.92	4.50	3.45	2.56	1.96

Source: A. T. Kearney, Inc. analysis, 1977.
One Percent Waybill Sample, excluding TOFC/COFC.
Exhibit V-8.

1 The combination test is for carloads passing all the following tests:

- Transportation Rate Differential Test
- Intramodal Competition
- Revenue/Variable Cost Test (One of the ratios)

A similar analysis was performed using the Rate/Service Differential Test instead of the direct rate comparison or Rate Differential Test. The results, similar in nature to those of the previous combination test are given for five example SPC's in Tables V-14 and V-15, on the following pages, and for all SPC's in Exhibits V-9 and V-10.

Table V-14

Second Combination Test for Non-Competitiveness: Percent of Carloads for Five Selected SPC's[1] High Range of Motor Carrier Costs

SPC	Description	% of Carloads Over 1.3 R/C Ratio	% of Carloads Over 1.4 R/C Ratio	% of Carloads Over 1.5 R/C Ratio	% of Carloads Over 1.6 R/C Ratio	% of Carloads Over 1.7 R/C Ratio	% of Carloads Over 1.8 R/C Ratio
2	Wheat	4.96	4.1%	3.3%	2.8%	2.4%	2.1%
13	Fresh Vegetables	0.4	0.4	0.4	0.0	0.0	0.0
55	Furniture	3.5	2.2	1.4	0.5	0.2	0.1
72	Organic Chemicals	8.9	7.8	6.3	5.3	4.1	3.4
100	Iron & Steel Products	.8	.6	.4	.3	.2	.2
	ALL CARLOADS IN SAMPLE	5.8	4.6	3.6	2.8	2.2	1.6

Source: A. T. Kearney, Inc. analysis 1977
One Percent Waybill Sample, excluding TOFC/COFC.
Exhibit V-9.

1 The combination test is for carloads passing all of the following tests:

- Rate/Service Differential Test
- Intramodal Competition Test
- Revenue/Variable Cost Test (One of the ratios)

Table V-15

Second Combination Test for Non-Competitiveness: Percent of Carloads for Five Selected SPC's[1] with Low Range of Motor Carrier Costs

SPC	Description	% of Carloads Over 1.3 R/C Ratio	% of Carloads Over 1.4 R/C Ratio	% of Carloads Over 1.5 R/C Ratio	% of Carloads Over 1.6 R/C Ratio	% of Carloads Over 1.7 R/C Ratio	% of Carloads Over 1.8 R/C Ratio
2	Wheat	2.33%	1.82%	1.29%	0.86%	0.76%	0.53%
13	Fresh Vegetables	0.4	0.4	0.4	0.0	0.0	0.0
55	Furniture	0.61	0.46	0.38	0.08	0.08	0.08
72	Organic Chemicals	3.89	3.24	2.38	1.78	1.35	1.08
100	Iron & Steel Products	0.23	0.15	0.08	0.04	0.04	0.04
	ALL CARLOADS IN SAMPLE	2.81	2.16	1.49	1.07	0.74	0.56

Source: 1. A. T. Kearney, Inc. analysis 1977
One Percent Waybill Sample, excluding TOFC/COFC.
Exhibit V-10

1 The combination test is for carloads passing all of the following tests:

- Rate/Service Differential Test
- Intramodal Competition Test
- Revenue/Variable Cost Test (One of the ratios)

(b) Combination Tests For Competitiveness

On the assumption that one type of competitiveness is sufficient to have a "competitive market," a joint test with an "either-or" type of condition was applied to the sample data. In this test a movement was determined to be competitive if:

- the imputed truck cost to shippers was below the rail rate
- or the delivered price increase for a switch to truck would be less than the arbitrary threshold
- or intramodal competition was potentially present

Since the absence of a high revenue/cost ratio does not necessarily imply the presence of competition, the revenue/cost ratio test was not directly included in this joint test. Table V-16 presents the results of this test for the five example SPC's.

The percentages in Table V-16 were based on the intramodal competition test which considered each combination of origin and destination carrier (see Chapter IV for explanation of this test). The high values for these commodities are typical of nearly all SPC commodity groups as will be seen in the complete listing contained in Exhibit V-11.

Table V-16

First Combination Test for Competitiveness (Short-run): Percent of Carloads for Five Selected SPC's[1] with High Truck Estimates

SPC	Description	Percent by Carloads
2	Wheat	90.8%
13	Fresh Vegetables	96.4
55	Furniture	79.0
72	Organic Chemicals	86.9
100	Iron & Steel Products	98.5
	All Carloads in Sample	87.6%

Source: 1. A. T. Kearney, Inc. analysis, 1977. One Percent Waybill Sample, excluding TOFC/COFC. Exhibit V-11

1 The combination test is for carloads not passing any of the following tests:

- Transportation Rate Differential Test
- Rate/Service Differential Test
- Intramodal Competition Test

Since the market share trend test results indicated a substantial amount of traffic with declining rail market shares, another joint test was developed to include with the combination test for competitiveness. Here, a movement was considered competitive either if it was found competitive by the test of short run competition discussed above or if it was found to have a declining rail market share, i.e. a sign of long run competitiveness. Table V-17 presents the results of this additional combination.

As indicated in Table V-17, on the following page, nearly all traffic was rated competitive by at least one of the tasks for competitiveness. There were no significant exception through all SPC commodity groups, as shown by the complete list in Exhibit V-12. Further inclusion of the stability test produced trivially different percentages. A caution against drawing a hasty conclusion from these data should be mentioned. An interpretation of these values is offered in Chapter VII along with an analysis of all other results in this Chapter. The results reflect the interaction of specified tests with a data base of rail movements. Extension of those results to rail traffic in general requires considerable judgment and qualification.

Since the joint tests of competitiveness (less the market share trend test and stability tests) constituted the most complete estimate of competitive traffic, it was used as the basis for a set of additional analyses directed toward a better understanding of the nature of potentially competitive rail traffic. First, the jurisdiction of the Commission is substantially limited to interstate traffic; thus the percent of this traffic moving on interstate rates was determined. Second, non-compensatory rates will undoubtedly be given closer scrutiny by the railroads and the Commission as implementation of the 4R Act proceeds; the percent non-compensatory (that is revenue below Rail Form A variable cost) was determined also. Next, traffic which is both non-compensatory and interstate may be treated differently, from a procedural standpoint, from intrastate noncompensatory traffic; a percentage was determined for this traffic also. Finally, it was found that a substantial percent of traffic considered competitive by the combination test also had high revenue/cost ratios. Since this also might have implications for procedural design, a percentage of tons and carloads was developed for competitive traffic having high revenue cost levels.

Table V-18 on the following page lists the percentage of competitive traffic (not of total traffic) for each condition described above, for the five example SPC groups and for the total of all carloads in the sample. Appendix C in a separate volume of statistical appendices provides the full set of statistics.

TABLE V-18

Characteristics of Competitive Traffic

Characteristics	WHEAT		FREST VEGETABLES		FURNITURES		ORGANIC CHEMICALS		IRON & STEEL		ALL 5 COMMODITIES	
	%Tons	%Carloads	%Tons	%Carloads	%Tons	%Carloads	%Tons	%Carloads	%Tons	%Carloads	%Tons	%Carloads
Interstate Traffic	72.1	72.0	98.2	99.9	92.0	91.1	84.1	84.8	86.2	87.1	87.5	86.9
Interstate and Non-Compensatory	21.0	20.6	26.2	33.2	21.5	22.8	6.2	6.7	3.9	5.9	19.5	19.7
Non-Compensatory	25.4	25.9	26.2	33.2	28.0	26.7	9.0	10.0	6.2	8.6	35.0	34.1
Rev./Variable Cost over 1.3	60.7	60.1	2.7	2.5	37.3	32.8	71.8	71.7	83.1	78.8	59.6	55.5
Rev./Variable Cost over 1.4	55.7	55.1	0 8	0.8	30.0	24.7	65.1	64.8	77.7	72.6	30.6	46 7
Rev./Variable Cost over 1.5	50 8	49 6	0.4	0.4	21.1	16.3	59.0	58 3	71.7	66.1	42.2	38.7
Rev./Variable Cost over 1.6	45.4	43.8	0.4	0.4	14.2	10.6	52.7	52.1	64.6	58.7	34.9	31 7
Rev./Variable Cost over 1.7	41 4	39.8	0 4	0.4	9.4	6.8	47.6	46.8	56.6	50.7	28.7	25.8
Rev./Variable Cost over 1.8	38.3	36.5	0.4	0 4	6.2	4.1	41.9	40.7	48.4	42.7	23.6	21.1

Source: A. T. Kearney, Inc. processing of specially prepared One Percent Waybill Sample for 1977 with TOFC/COFC excluded.

CELL STRUCTURE

A more detailed analysis wad achieved by further stratification of the data into study cells. The cells used for the analysis are defined by SPC commodity, length of haul, carload weight, and rate territory. The theoretical discussion of market dominance reveals that no single hypothesis of market power is adequate in empirically determining a rail carrier's market dominance. Any test or procedure based on one concept of market dominance is not likely to be accurate. Considering the imperfection in the data base, theoretical construct and estimation methodology, only a multi-dimensional approach can capture the complexity of the concept. This means only repeated application of different hypotheses can give some degree of confidence in the final empirical results.

However, random application of the tests to a large sample of traffic movements is not meaningful. The movements were segmented into relevant categories so the results would be interpreted for a traffic group sharing common attributes. A scoring system then was established to catalog the results in a manner consistent with the underlying assumptions for the measurement of market power. At this stage, the tests were subjected to a reliability test to determine whether each of the tests is consistent to the entire scoring system. Since these tests are constructed from various hypotheses of market dominance, there is no reason they should all be accepted as valid measurement _a priori_. It is through this process the empirical results are presented. This section contains the following elements sequentially:

- -- Categorization of the movements
- -- Scoring system
- -- Reliability analysis
- -- Resulting tests
- -- Cell level statistics
- -- SPC level statistics
- -- Competitive traffic

(a) Categorization of Movements for the Cell Structure

The One Percent Waybill Sample data base contains 145,000 railroad movements. These movements are stratified by four characteristics: first, commodity groups (SPC); second, mileage classes; third, weight classes; and fourth, rate territories to form a cell. The following is the stratification scheme:

Commodity Groups:	127 commodities by Standard Product Code (SPC)[1]
Mileage:	0 to 150 151 to 300 301 to 600 601 to 1,200 1,201 and up
Weight (tons):	0 to 55 56 to 80 81 to 125 126 and up
Rate Territories:	Official Southern Southwestern Western Trunk Mountain-Pacific

Due to the importance of the commodity characteristics the SPC has been employed as the primary sorter and the cells are grouped by the SPC throughout the statistical analysis.

(b) Scoring System

Within each cell structure all movements undergo a set of tests individually and the number of tests passed are recorded for the movements. Each of the tests is constructed on one or a number of threshold conditions reflecting the assumptions of the hypothesis which the test employs. For example, the hypothesis of competition by rates dictates the formulation of a ratio of the truck to rail rate. Disregarding service differential and other factors, the threshold of the ratio can be set to one, assuming it is to be the breakeven point. Of course, depending on the assumption, the threshold level can be changed and the test reconstructed. Since these tests are to measure the level of non-competitiveness, passing of the threshold -- in the above example, when the ratio is greater than one -- triggers a flag of one. Conversely, a failure to pass triggers a flag of zero.

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1 The listing of SPC commodities is presented in Appendix C.

In this manner, a row of ones or zeroes is entered for each movement; a column of ones or zeroes is entered for each test. A hypothetical cell (i, j, k, l) having three movements has the following structure:

Table V-19

Hypothetical Cell (i,j,k,l,) Structure Defined By SPC (i), Mileage (j), Weight (k), and Territory (l)

Movements (Waybill No.)	Test Number 1	2	3	4	5	6	7	8
1	0	1	0	1	1	0	1	1
2	1	1	0	0	1	1	1	0
3	0	0	1	1	0	1	1	0

The construction of the tests for non-competitiveness have been presented in the previous Chapter. Briefly, the tests and their passing conditions are as follows:

1. Transportation Rate Differential Test: Truck rate to rail rate is greater than one.

2. Rate/Service Differential Test: For homogeneous products, increase of more than three percent. For non-homogeneous products, increase of more than five percent.

3. Market Share Trend Test: Increasing or stable rail traffic share by BEA pair and commodity.

4. Intramodal Competition Test: Seventy percent or more of any traffic by BEA pair and commodity carried by one carrier or one combination of origination and destination carrier.

5. Demand Stability Test: Having the standard deviation of the weekly to average weekly shipment ratio less than 1.25 and having crossing the same ratio set as one, 20 or less times.

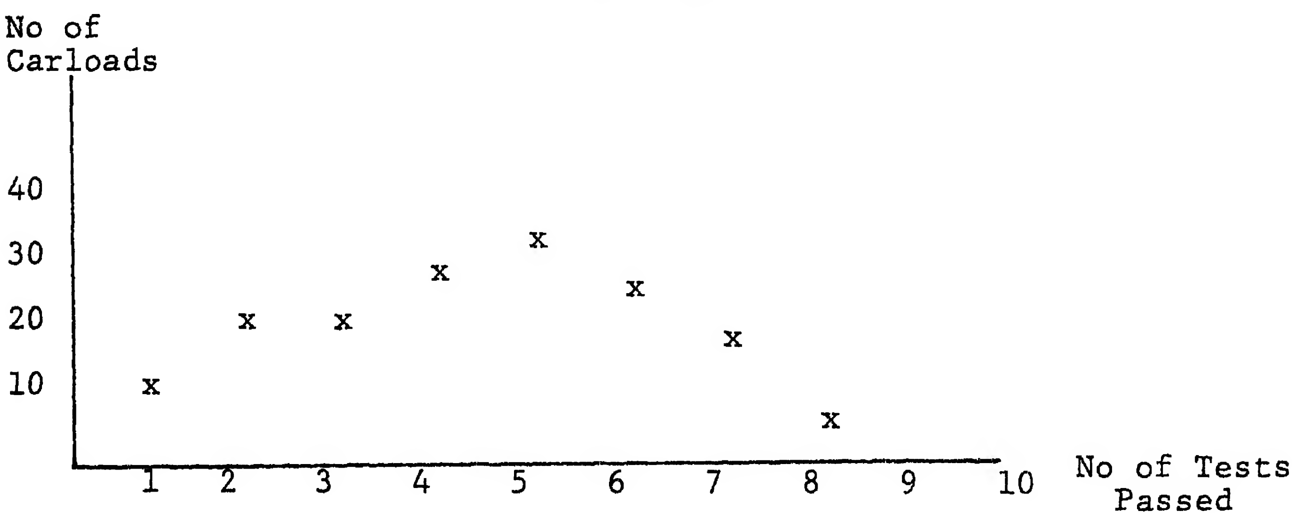
6.	Rate/Service Differential/ Intramodal Competition Test:	Passing both tests.
7.	Transportation Rate Differential/Intramodal Competition Test:	Passing both tests.
8.	Revenue to Variable Cost Ratio Test:	Having the ratio greater than i, where i = 1.3, 1.4, 1.5, 1.6, 1.7, and 1.8.

The importance of the intramodal competition in our scoring system is readily perceivable. The present position of the Commission to discourage collective ratemaking necessitates and careful evaluation of potential competition, assuming rate bureaus activities are to be reduced. The resulting scores or non-competitiveness index should be interpretted in this light.

The numerical content of the cell can now be condensed into a set of information, namely, the number of movements for each number of tests passed. Since carloads are more informative than the movements, the statistic is converted to a number of carloads for each number of tests passed. With this information, a frequency diagram can be constructed. A hypothetical one may look like the one in Figure V-1.

Figure V-1

An Hypothetical Cell Frequency Diagram



In fact, this is a statistical distribution of carloads over the number of tests passed. The distribution can provide answers as to what is the average number of tests passed, how do the carloads deviate from this average and how normally distributed are the carloads around the average. Assuming the tests are constructed validly, the statistics indicate the level of market power for the group of observed movements in the cell. Depending on the characteristics of the cells, their distribution patterns will vary. In this sense, the market dominance related characteristics may be located by correlating the amount of the characteristics with the average number of tests passed, throughout a group of different cells. For example, given a commodity group it may be that the cells with high mileage, on the average, have a higher mean test score. But it should be noted that the results are based on the One Percent Waybill Sample and whether the statistics can fully reflect all the traffic on the characteristics of the cell depends how well does the one percent sample represents the true population.

The statistics have also been examined from the perspective of the underlying assumptions of the scoring system. The tests are constructed so that each positive result (finding of market power) of a test is a necessary condition for determining market power. On the other hand absence of positive result is a sufficient condition to determine market competition. Therefore, the system is based on the summation of the tests results. Conceptually, this means everytime one more form of market power is observed, the identification of market power is strengthened. The system also implies that the degree of market power is related to the number of ways it is observed. This requires each test to measure market power independently and yet contribute toward the findings of market power. Each test becomes a necessary but not sufficient condition for the finding of market dominance. Nevertheless, whether the proposed tests do fulfull these conditions or not is an empirical matter. Not only the traffic are under examination, but also the methodology itself has to be tested. The next section discusses the empirical testing of the proposed tests.

(c) Reliability Analysis

In order to examine the credibility of the final statistical results from the cell structure, the scoring system has to be reviewed in terms of its internal consistency. Based on the assumption that the passing of each additional test increases the market power index which is the total score from all the tests, each test has to be consistent with the index. This

means, on the average, a test should indicate a "market power" result when other tests do also. Statistically, the correlations between the index or total score and the individual tests should be positive. If the test lacks this positive relationship, it is indicating the opposite result, i.e., when other tests measure "market power" positively, it does not. Such an occurance indicates that the summation of the test score is invalid. The total score can no longer be construed as an index of market power since some of the tests are off setting each other. The assumption of continuous addition has to be abandoned.

However, it should be clarified that although the scoring system in such a case has to be abandoned, the validity of each test, on its own, is not lost. It is merely that particular combination of tests which is questioned. Therefore, through the reliability test one can choose a consistent set of tests by simply observing the correlations between the aggregate score and each of the tests. Meanwhile, the inconsistent test can still be used for its particular purpose, as long as it possesses sufficient validity.

In essence, the reliability of a total test score can be tested through two sets of correlation measures. One is the correlation matrix consisting of all the tests. Here we can observe the details of cross correlation coefficients among the tests. The other measure is the correlation coefficient between the total score and the test. On the latter measures, the tests for the necessary and sufficient conditions for the scoring to be internally consistent, all correlation coefficients have to be positive.

The reliability analysis for the proposed eight tests of non-competitiveness is conducted on the basis of movements from five heterogeneous commodity groups: wheat, fresh vegetables, furniture, organic chemicals, and manufacturing iron and steel. This group captures a wide enough range to cover the characteristics of all the cells. The results are shown in Exhibit V-13 and Table V-20 on the following page.

The correlation matrix in Exhibit V-13 reveals a number of negative cross correlation coefficients. Item three, the market share trend test shows consistent negative relationships with the other tests. Items five and eight, the stability test and revenue/cost ratio test have all but one negative correlation with the other tests. Taking a total score perspective from Table V-20, the results are the same. The above three tests

Table V-20

Individual Tests to Total Score Correlation Coefficients for the Reliability Analysis (Adjusted for Sample Size)

	Tests	Coefficients
1.	Rate Differential Test	0.455
2.	Rate/Service Test	0.288
3.	Market Share Trend Test	-0.110
4.	Intramodal Competition Test	0.146
5.	Stability Test	-0.237
6.	Combination	0.375
7.	Combination	0.558
8.	Revenue/Cost Rates Test	-0.182

Source: A. T. Kearney, Inc., analysis of 1977 One Percent Waybill Sample, excluding TOFC/COFC

correlate negatively with the total score. Applying the reliability test on each of the commodity levels produced the same set of negative correlation coefficients. At this point, it is obvious that the scores will be undefensible if the scoring system is to proceed with the eight tests. It may be that the three tests have to form another group of tests or even perform individually. Again, the reliability analysis merely shows the infeasibility of the combination, not the failure of the tests on their own.

There are some possible reasons for the negative correlation coefficients on the three tests. The market share trend test has a weak data base due to the incompleteness of the Commodity Transportation Survey from the Bureau of Census. Unlike the Waybill Sample which is updated annually, the Census data are collected and published every five years. Some data were discarded because many types of traffic only appear on one of the two years that were used to calculate the rail market share change. The Census data also do not include shipments of bulk raw materials, minerals, lumber, and unprocessed agricultural products. Quarterly Commodity Statistics was used to supplement the deficiency. But the dichotomy of the data base may have affected the test results since substantial amount of shipments were excluded from the Census data.

The stability test may have been weak on two grounds. Theoretically, stability is not a necessary condition for market

dominance. Traffic which is stable still may encounter competition from other carriers. The test may also have suffered from measurement error because the stability index is obtained from previous study on seasonality. As such, the element of unpredictability is not accurately incorporated.

The exclusion of the revenue/cost ratio is an intriguing result from the reliability analysis, considering its present procedural role in the determination of market dominance. One possible reason for the test's negative correlation is that under a regulatory environment, past accounting data simply do not reflect the potential competitiveness of the carriers. Competitive pricing behavior is suppressed by the institutional constraints. Another reason may lie in the pricing strategy of the rail carriers. The practice of value of commodity pricing may still exists in some traffic, and thus not showing the competitive side of the railroads. Since the high commodities are the likely targets of truck competition, high rail rates can not correlate with rail market dominance. Such distortion may have caused the test to behave differently from the others.

These three tests are now re-incorporated into the statistical analysis, not as a scheme to test market power, but as background information to supplement the finding of market dominance. They may also be used to support procedural analysis as some secondary screens for exemptions from prior market segmentation.

Through a series of the reliability analysis a final set of tests is found to fulfill the condition of internal consistency in the summation of the test score. They are:

1. Transportation Rate Differential Test
2. Rate/Service Differential Test
3. Intramodal Competition Test
4. Rate/Service Differential/Intramodal Competition Test
5. Transportation Rate Differential/Intramodal Competition Test

CELL LEVEL STATISTICS

The cell level statistics present two kinds of information. First, the distribution of the cells throughout an SPC commodity

is given. Second, since the characteristic identification of each cell and the number of carloads in the cell are given, the distribution of the traffic throughout the cells can easily be perceived. Then the mean market power scores of the cells are presented, together with their standard deviations. The maximum scores and the modes of the cells are also shown. The latter statistic shows the score which appeared in each cell most frequently. The entire cell level statistics for all the SPC commodities are presented in Appendix D (included in a separate volume). Two of the commodities, cotton and glass containers, are selected for demonstrative purposes. Exhibits V-14 and V-15 contain the statistics for these two commodities.

For cotton, there are 23 cells categorizing 386 carloads throughout the four characteristics. The table shows low cell means for the cells with significant amount of carloads, except with the mileage of 1,201 and up where mean scores of 2.07 and 2.39 are recorded. However, as the mileage goes up, the standard deviations of the means also increase, showing greater variation of the scores in the high mileage cells. The maximum score of the cells of course rises as more carloads are included in the cells. The four columns on the right-hand-side in Exhibit V-14 are the results of the three tests which were excluded from the scoring system by the reliability analysis. Examining the third column from the right, the percentage of traffic having a revenue/cost ratio of higher than 1.4 is shown for each cell. For example, the largest cell with 50 carloads has 44 percent of its traffic operating with a revenue/cost ratio of 1.4 and higher. However, when the threshold is increased to 1.8 (on the third column from the right) the 44 percent is reduced to 4 percent.

Going into the commodity, glass containers, it is immediately obvious that the mean scores are somewhat higher compared with the ones in cotton. The positive correlation between mileage and mean scores is still clear, except the range of the mean scores have reached the maximum of five for the traffic with high mileage. A noticeable difference between the means of cotton and glass containers is that the standard deviation of the latter is generally smaller for the high scoring cells. From these results it can be concluded that based on the one percent Waybill Sample can be statistically observed a relatively higher level of market power in glass containers traffic than in cotton traffic.

The cell level statistics serve as the basis for further analyses at higher levels of aggregation. For a more summarized form of results, SPC level statistics are examined.

SPC LEVEL
STATISTICS

In order to arrive at findings of market power by different commodities, the cell level statistics have to be assimilated into SPC groups. This is done by averaging the cell level mean scores, modes and standard deviations weighted by the number of carloads in each cell. The percent of traffic passing the thresholds of demand stability, revenue to cost ratio and market share trend analyses are also aggregated to the SPC level. In addition, the number and percent of carload from non-compensatory movements are calculated. Finally, the number of carload and cell for each number of tests passed is presented together with the number of carload passing each individual test. Again, the results can be examined only for selected commodities due to the volume of the output. The entire SPC level statistics are presented in Appendix E.

In this section the group of the commodities: wheat, fresh vegetables, furniture, organic chemicals and manufactured iron and steel will be again used to show the nature of the SPC level statistics (the full statistics are in Exhibit IV-16, 17, 18, 19 and 20). The key statistics of the five commodities are compared in Table V-21.

Table V-21

Score Statistics for Five Selected SPC's

SPC	Description	No. of Carloads	No. of Cells	Mean Score	Standard Deviation
2	Wheat	3,953	70	1.78	0.99
13	Fresh Vegetables	253	8	1.01	0.60
55	Furniture	1,316	35	2.55	1.22
72	Organic Chemicals	1,852	81	2.05	1.03
100	Iron and Steel Products	2,607	78	0.83	0.54
	Average	1,996	54	1.66*	0.90*

* Weighted by carloads

Source: A. T. Kearney, Inc., analysis of 1977 One Percent Waybill Sample, excluding TOFC/COFC.

With a mean score of 0.83, Iron and Steel Products is the commodity where the leasts rail market power is observed. It also has the smallest standard deviation, despite the large number of carloads and cells. The result is intuitively acceptable considering that manufactured iron and steel products are high value commodities and face a high degree of truck competition. The mean score of 2.55 for furniture is somewhat higher than expected. Wheat has come out close to the mid-range of the five mean scores. Organic chemical movements are present in a wide range of cells, or traffic, e.g. with carloads per cell of 37.6 compared with 56.4 in wheat.

It is clear from the statistics in Table V-21 that quantitative results alone are not adequate to address the question of market power. The scoring system is a tool which needs enhancement from other types of empirical analysis and, more importantly, qualitative analysis based on a sound understanding of the commodity under study. Another point can be made on the range of the scores. It should be stressed that the scores are to be used in relative terms. For example, one can make the statement that rail carriage conditions in the organic chemical market is less competitive than the ones in the iron and steel market. But it is incorrect to determine the organic chemical traffic to be market dominant in this context, since the question of whether a score of 2.05 constitutes market dominance or not depends on the range of the other SPC mean scores.

Exhibits V-16 to V-20 provides the full SPC level statistics for the five commodities. It is interesting to note that with the exception of wheat traffic, other traffic groupings have passed the Transportation Rate Differential Test and the Intramodal Competition Test most frequently, with the Rate/Service Differential Test as the third most frequent. The ranking of the traffic groups having their revenue to cost ratio at 1.4 or higher shows the iron and steel products traffic as the most favorable of the five, and fresh vegetable traffic as the lowest with only 1.1 percent of them above the 1.4 revenue to cost threshold

SAMPLE LEVEL STATISTICS

The sample level statistics represent the summary statistics of all the movements throughout all the SPC's. Exhibit V-21 contains the summary statistics for all SPC's with the total carload of 147,986 and the sample mean score of 2.02. The most frequently passed test is the Transportation Rate Differential

Test (at the threshold of 1.4). For a complete listing of SPC commodities and their respective mean scores refer to Exhibit V-22. Due to the large size of the entire sample, a matrix is constructed to show the distribution of carloads by mean scores and their standard deviations. This Summary Statistical Matrix is presented in Exhibit V-23. The columns from left to right show increasing standard deviations. The three numbers in each element are number of cells, carloads and tons. Disregarding the standard deviations, the distribution of the carloads through the mean scores is shown in Table V-22.

Table V-22

Percentage Distribution of the Carloads by Mean of Scores

Mean of Scores	Percent of Total Carloads
0	15%
1	22%
2	48%
3	11%
4	2%
5	1%

Source: A. T. Kearney, Inc., analysis of 1977 One Percent Waybill Sample, excluding TOFC/COFC

Close to half of the carloads scored around 2.0 with 85 percent of the carloads passing two or less tests. Since the entire sample mean is 2.02, only approximately 15 percent of the carloads passed more than two tests. The distribution around the mean of 2.02 is close to normal with a degree of skewness toward the right. Out of the carloads passing two tests, 62 percent of them have a standard deviation of less than one. Table V-23 shows the percent of carloads passing each number of the tests with a standard deviation of less than one.

Table V-23

Percent of Carloads Passing Each Number of Tests With a Standard Deviation of Less Than One

No. of Tests Passed	Number of Carload with a St. Dev. of Less Than One
0	89%
1	52%
2	62%
3	3%
4	9%
5	100%

Source: A. T. Kearney, Inc., analysis of 1977 One

It seems there is less variation for the carloads passing either end of the score range. For carloads passing three or four tests, less than 10 percent of them have standard deviation of less than one.

FURTHER EXAMINATION OF MOTOR CARRIER COMPETITION

(a) Rail and Truck Competition

Throughout the empirical analysis measures of truck competition have consistently shown to be important. Its role was significant through all stages of the analysis, scoring system, correlation to the index of market power and industry analysis. It seems the competitiveness of the railroad is inherently tied to motor carrier competition and the competitive structure between the two modes needs special research effort.

In the scoring system used to measure possible market power the test of transportation rate differential had the highest number of passes with the threshold ratio of 1.0. For example, taking the selected five commodities of wheat, furniture, fresh vegetables, organic chemicals and iron and steel, 81.3 percent of the carloads in these commodities passed the test. Another measure employing truck and rail rate difference, the rate/-service differential test, also had a passing rate of 62.3 percent of the carloads for the same five commodities. The distinction between the two tests is that the former one employs a ratio and the latter a difference.

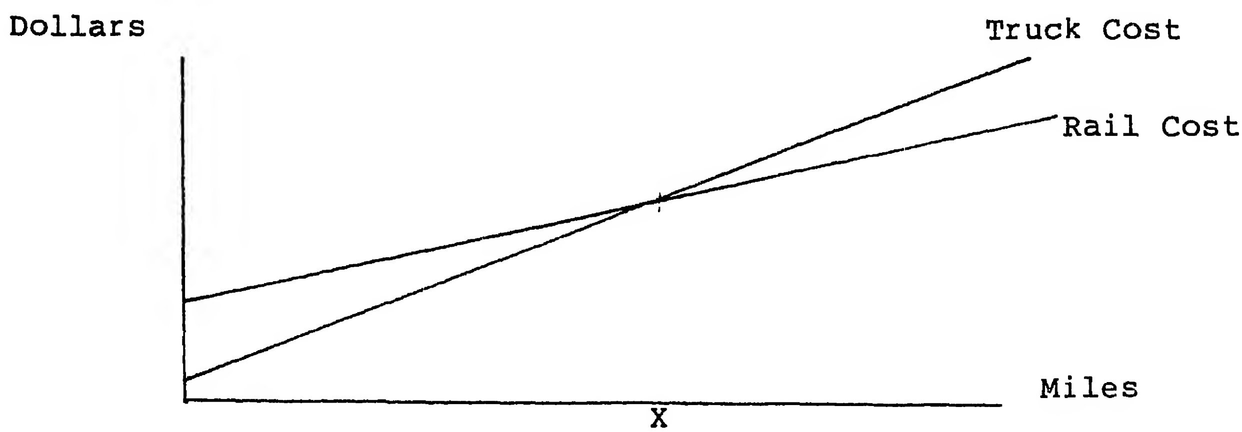
The performance of the tests can be more rigorously examined by going back to the reliability analysis. From Exhibit V-7 we can see the transportation rate differential test correlated positively with most of the other tests, with the exception of the demand stability and the revenue/cost tests. The latter two tests are of course later determined to be inconsistent with the scoring system and subsequently dropped. The correlation of the test to the aggregate score is shown in Table V-20 as being 0.45, establishing its importance in the scoring system. The rate/service differential test also survives the reliability analysis well.

The importance of truck to rail competition is also revealed by the industry analysis through a number of shipper interviews. An important determinant of the truck to rail competition was found to be the length of haul the shipper has to consider. As the transit mileage increases the rail carrier becomes increasingly competitive relative to truck. On the other hand, trucks are considered to have more advantages for the short hauls.

Depending on the nature of the commodity, the competitive mileages differ for the two modes. Analytically, this simply means the shipper is facing two kinds of transportation cost curves which are based on technical constraints. When these costs curves are expressed in terms of mileage, as done in Figure V-2 the interaction of the curves is interesting to study.

Figure V-2

Illustration of Transportation Breakeven Mileage for Rail and Motor Carriers



Given accurately constructed cost curves, the intersection of the curves is the breakeven mileage for using rail or motor carrier. In Figure V-2, truck is more competitive for movements shorter than X miles and is less competitive for movements longer than X miles.

The estimated mileage breakeven points may reinforce the scoring system in identifying the competitive traffic; it is clear that railroads are generally unable to complete with trucks for distances under the breakeven point mileage. However a more rigorous multivariate analysis may be needed to further refine the estimates since the competition is not only based on length of haul but other factors, such a service differential, cost of storage and cost of out-of-stock.

(b) Estimation of the Truck and Rail Breakeven Point

In order to study the competitiveness between rail and motor carriers for various commodities, the difference between the rail and truck costs is calculated and its relationship to transit mileage is estimated. Then by setting the cost difference

equation to zero, the breakeven point can be solved. The same data base from the One Percent Waybill Sample is employed. The commodities are selected on the basis of diversity in length of haul.

Another approach to the determination of breakeven point is to use the delivered price increase variable in the Rate/Service Differential Test. First, the relationship between the percentage increase in the delivered price and mileage has to be estimate. Then assuming an increase of five percent in the delivered price to be the point where the shipper is ready to switch mode, the breakeven mileage can be calculated. The resulting breakeven points from the two methods are shown in Table V-24 and V-25.

Table V-24

Estimated Breakeven Points Between Rail and Motor Carriers by Mileage with High Truck Cost

SPC	Truck-Rail Cost Diff. (Miles)	F	Adjusted R Square	Delivered Increase (Miles)	F	Adjusted R Square
2	147	1,170.9	0.74	133*	2,540.6	0.80
6	66	821.8	0.91	166*	360.4	0.75
13	3,116	8.9	0.07	3,500	28.3	0.09
27	94	238.2	0.68	68	384.7	0.71
31	1,137	26.1	0.51	2 650	231.7	0.80
35	216	128.5	0.15	470	397.3	0.42
39	424	93.0	0.20	778	299.7	0.56
42	225	119.3	0.55	700	261.5	0.75
48	356	47.2	0.41	1,000	88.2	0.70
55	492	15.2	0.11	857	406.7	0.58
56	380	105.1	0.85	1,325	309.8	0.92
63	547	502.2	0.67	750	791.1	0.74
67	177	97.3	0.37	950	146.6	0.62
72	202	3,289.9	0.64	507	6,146.2	0.76
77	245	396.5	0.66	1,000	731.3	0.79
82	25	150.2	0.53	1,016	902.6	0.78
89	708	109.6	0.61	1,933	278.8	0.75
97	933	5.6	0.40	1,200	10.0	0.63
100	930	8.88	0.30	5,888	364.8	0.12
109	430	56.2	0.64	2,000	31.4	0.67
118	754	74.9	0.28	2,600	8.5	0.16

* Due to the homogeneous nature of these commodities, a 0.03 percent increase was used to determine the breakeven point.

Table V-25

ESTIMATED BREAKEVEN POINTS BETWEEN RAIL AND MOTOR CARRIERS BY MILEAGE WITH LOW TRUCK COST

SPC	Truck/Rail (Miles)	F	Adjusted R Square	Delivered Increase (Miles)	F	Adjusted R Square
2	327.11	371.102	.494	328.667	824.153	.54351
6	158.329	446.581	.859	250.833	284.546	.69161
13	1667.086	13.590	.064	1795.484	16.220	.08351
20	71.476	4328.456	.774	48.704	9402.323	.79973
27	96.342	202.691	.596	72.040	376.725	.75953
31	3101.358	10.396	.518	4158.389	78.116	.72493
35	638.141	84.571	.133	708.984	217.541	.32891
39	775.289	63.247	.198	1367.82	252.650	.56751
42	608.491	43.003	.396	775.582	167.669	.69207
48	1.593	7.343	.271	2122.745	29.074	.62390
55	696.106	13.053	.083	1157.437	315.179	.52171
56	943.957	20.585	.781	2398.217	92.583	.87527
63	702.342	373.002	.575	1040.058	593.429	.69404
67	504.616	32.116	.319	1815.709	63.670	.47749
72	551.916	78.824	.424	747.759	379.039	.67354
77	479.084	205.293	.512	1907.121	197.603	.56783
82	585.133	7.926	.262	1309.529	449.730	.66557
89	951.030	71.090	.465	2644.884	196.220	.66169
97	1513.651	4.281	.369	2967.993	2.372	.60229
118	1853.070	24.116	.177	3120.472	8.401	.14562

IDENTIFYING THE COMPETITIVE TRAFFIC

The above empirical results now need to be re-examined through the basic assumptions underlying the scoring system. Although the tests are constructed to detect market power, each of them can not product a sufficient condition for the existence of market dominance. The summation of the positive results continuously increases likelihood of market power. However, the absence of the positive results does provide sufficient evidence for competitiveness. Conceptually this means if none or only few

of the tests identify market power, there is a high probability that some form of competition still exists. In other words, the lack of "observable" market power from a majority of the tests may mean there are competitive forces at work. For example, if a movement passes only the rate differential test, this means it did not gain traffic share, it has intramodal competition and the commodity's delivered price is not strongly affected by a modal switch. It becomes obvious the movement should be identified as competitive. In this respect the tests are identifying competition through the negative results. In particular, the accumulation of the negative results constitutes the existence of competition.

Given this set of assumptions, the statistical analysis is reformulated to search for the carloads which can be classified as competitive. In order to do this, only movements in the cells with their mean scores plus two standard deviations less than 3.01 are selected to reconstruct the cell level statistics. This constraint, in effect, has discarded, first, any movement with a mean score of more than three; and second, any movement with a mean score below three but with a large enough standard deviation which would disqualify the movement when two standard deviations are added onto the mean. The resulting cell level statistics and SPC level statistics are presented in the Appendices F and G respectively. The effect of this constraint on traffic segmentation can be perceived on the sample statistics level. The summary statistics for all SPC commodities contained in Exhibit V-24 show that the total of 45,810 carloads and 713 cells are selected on the basis of mean score plus twice the standard deviation less than 3.01. This constitutes 31 percent of the total carloads and 13 percent of the total cells in the One Percent Waybill Sample. Considering 85 percent of the carloads had means lower than the sample average mean of 2.02, this search for competitive traffic can be seen as conservative.

Relative to the total sample, distribution of the selected competitive traffic can be examined graphically through the summary statistics matrix in Exhibit V-19. Notice that the selected 45,810 carloads are in the north-west corner of the matrix and are enclosed by the boundaries of 1.24 standard deviation and mean score of 2. Compared with the summary statistics matrix in Exhibit V-23, the pattern of the reduction is immediately clear.

A number of SPC's with mean cell values of less than 2.00 are presented in Table V-26. On a cell level the pattern can only be determined by examining the detail cell level statistics which defines the characteristics of the traffic in the cell. Appendix D supplies such detailed information for all SPC commodities. Here, cells with two standard deviations plus the mean less than 3.01 are randomly selected throughout the selected five commodities for illustrative purpose and shown on Table V-27. A more systematic ranking of the commodities and cells will be provided in the final report of the present study.

Table V-26

Selected SPC's with Mean Score of Less Than 2.0

SPC	Description	Mean Score	Standard Deviation
1	Cotton	1.48	1.00
2	Wheat	1.78	0.99
9	Sugar Beets	1.72	0.68
11	Apples	1.05	0.92
13	Fresh Vegetables	1.01	0.60
14	Melons	1.68	1.05
21	Lignite	1.82	0.59
28	Phosphate Rock	1.88	0.56
29	Fresh Meat	1.79	0.48
31	Other Canned Foods	1.73	1.21
37	Cooked Cereals	1.09	0.49
39	Malt Liquors	1.65	0.85
44	Cigars, Cigarettes	1.66	0.56
45	Textile Prod.	1.84	0.99
46	Pulpwood Logs	1.82	0.59
56	Woodpulp	1.85	1.12
57	Newsprint	1.63	0.43
58	Ground Woodpaper	1.72	0.79
59	Printing Paper	1.99	0.93
61	Pulpboard	1.86	0.84
78	Rubber	1.76	0.92
79	Detergents	1.40	0.82
82	Petroleum Ref. Prod.	1.52	0.80
89	Tires and Tubes	1.59	0.92
99	Semi-Fin. Steel	0.70	0.48
100	Mfd. Iron or Steel	0.83	0.54
101	Iron or Steel Pipe	1.28	0.40
104	Prim. Copper Prod.	1.39	0.66
106	Prim. Alum. Prod.	1.65	0.86
107	Copper Shapes	1.82	0.69
108	Alum Shapes	1.34	0.43
109	Metal Containers	1.92	0.89
110	Farm Machinery	1.04	0.48
111	Heavy Machinery	1.32	0.69
112	Maj. Hsehold Appliances	1.34	1.03
113	Houshold Appliances	1.10	0.53
114	Automobiles	1.40	0.42
115	Other Motor Vehicles	0.22	0.88
116	Motor Vehicle Parts	0.54	0.71
117	Loco. or Car Parts	1.55	0.61
118	Ferrous Scrap	0.60	0.38

Source: A. T. Kearney, Inc. Analysis of 1977 One Percent Waybill.

Exhibit V-22

Table V-27

Random Selection of Cells with Two Standard Deviations Plus the Mean Score Less than 3.01 for Five Selected Commodities

MILEAGE	WEIGHT (TONS)	TERRITORY	CARLOADS (In the Cell)	MEAN SCORE	STANDARD DEVIAITION
Wheat (SPC 2)					
0-150	56- 80	Western Trunk	103	0.17	0.41
0-150	81-125	Western Trunk	427	0.35	0.75
0-150	81-125	Southwestern	179	0.10	0.40
151-300	56- 80	Western Trunk	131	0.37	0.66
151-300	81-125	Official	30	0.87	0.82
151-300	81-125	Southwestern	164	0.47	0.85
Fresh Vegetables (SPC 13)					
1201- Up	0- 55	Southwestern	8	0.38	0.52
1201- Up	0- 55	Mountain-Pacific	221	0.46	0.65
Furnitures (SPC 55)					
151-300	0- 55	Official	66	0.44	0.50
151-300	0- 55	Southern	32	0.69	0.64
301-600	0- 55	Official	70	0.81	0.77
301-600	0- 55	Western Trunk	29	0.69	0.66
Organic Chemicals (SPC 72)					
0-150	56- 80	Official	20	0.40	0.50
0-150	56- 80	Southwestern	31	0.23	0.43
0-150	81-125	Southern	22	0.95	0.79
0-150	81-125	Southwestern	27	0.74	0.81
151-300	0- 55	Official	27	0.59	0.50
151-300	0- 55	Southwestern	28	0.38	0.49
301-600	56- 80	Official	40	0.90	0.93
301-600	81-125	Official	63	0.67	0.78
151-300	0- 55	Southwestern	8	0.38	0.52
Iron and Steel Products (SPC 100)					
601-1200	0- 55	Official	70	0.77	0.78
601-1200	0- 55	Southern	20	1.05	0.76
601-1200	0- 55	Western Trunk	17	1.00	0.61
601-1200	0- 55	Southwestern	16	0.88	0.72

SOURCE: A. T. Kearney, Inc., Analysis of 1977 One Percent Waybill Sample Appendix D.

SPECIAL ANALYSES

Several miscellaneous analyses were performed on the rail traffic sample data base as inputs for procedural design decisions. Three of these produced meaningful (or at least interesting) results and are reported in this section. First was an attempt to build a better understanding of the revenue/variable cost ratio as it related to measures of non-competitiveness. The second analysis was directed toward a better understanding of motor carrier competition. Lastly, there was a marginally successful effort to identify traffic subject to serious demand instability (and therefore difficult to regulate).

(a) Revenue/Variable Cost Analysis

In each of the tests described in this chapter where revenue/variable costs ratios were involved, a range of threshold values from 1.3 through 1.8 was employed. No indication has been presented as to which threshold ought to be applied in a regulatory setting. As an aid in making this judgment, revenue/variable cost ratios have been calculated for the single line traffic on each of the Class I carriers. Single line traffic was selected because information on divisions is not given on the waybill sample. It should be remembered that this selection is not a representative sampling of all the carriers' movements; however, it does suggest the level of profitability on that traffic where the carrier does not need to divide the revenue with other carriers.

Table V-28 lists ten of the carriers together with the mean and standard deviation of the revenue cost ratios (weighted by carloads) across all SPC commodity groupings.

Table V-28

Mean and Standard Deviation of Revenue/Variable Cost Ratios for Single Line Traffic of Selected Class I Carriers

AAR Code	Carrier	Mean Revenue/ Variable Cost Ratio	Standard Deviation
022	Santa Fe	1.20	0.86
076	Burlington Northern	1.21	0.68
125	Chesapeake and Ohio	1.50	0.65
131	Chicago and North Western	1.27	0.62
145	Rock Island	1.11	0.64
190	Conrail	1.29	0.62
197	Rio Grande	1.17	0.43
308	Grand Trunk	1.25	0.41
482	Soo Line	1.37	0.64
490	Katy	1.16	3.15
494	Missouri Pacific	1.21	0.87

Source: A. T. Kearney, Inc. analysis of 1977 One Percent Waybill Sample, excluding TOFC/COFC

The range of values shown in Table V-24 must be considered in light of the average for all carloads in the sample of 1.38. The values for single line traffic may be biased downward because of a greater proportion of intrastate traffic and shorter movements. Significantly there is very little observed difference between such financially troubled carriers as the Katy (Missouri-Kansas-Texas) and the Rock Island on the one hand and more successful carrier like Rio Grande and Santa Fe on the other.

(b) Motor Carrier Cost Differential Analysis

Arguments have been presented in the public debate on deregulation for a simple test of truck competitiveness using a fixed percentage of truck rate over rail rate as a threshold. In order to understand better at what point above rail rates truck service might become non-competitive a comparison was performed using the two tests of motor carrier competitiveness employed in this study: the Rate Differential Test and the Rate/Service Differential Test.

This analysis was focused on those movements where the imputed truck costs to shippers exceeded the rail rate (or fully allocated cost, if higher) but for which the delivered price was estimated to increase less than five percent (three percent for homogenous commodities). Based on the construction of the two truck tests and the assumptions supporting them, this traffic may be considered to be truck competitive even though motor carrier rates could exceed rail rates. Service factors would account for this effect. A total of 31,200 carloads out of 148,007 in the sample met this condition, approximately 21%.

Table V-29 below contains the mean and standard deviation of the truck rate/rail rate ratios for the five example SPC commodity groups and for the entire subsample of 31,200 carloads. A complete listing of the data is presented in Exhibit V-25.

Table V-29

Truck/Rail Cost Ratios for Service-Only Competitive Traffic - Five Selected SPC's - High Range Truck Cost Estimate

SPC	Description	Means of Ratios	Standard Deviation of Ratios
2	Wheat	1.05	0.27
13	Fresh Vegetables	1.04	0.03
55	Furniture	1.43	0.39
72	Organic Chemicals	1.49	0.74
100	Iron and Steel Products	1.32	0.34
All carloads in subsample		1.52	0.89

Source: A. T. Kearney, Inc., analysis of 1977 One Percent Waybill Sample, excluding TOFC/COFC

In general, the truck/rail ratios vary considerably both among and within SPC commodity groupings. The variables which impact the exact amount of the ratio are of course value per ton and mileage, both of which vary greatly throughout the sample.

(c) Instability Analysis

In Chapter III it was argued that unstable or unpredictable demand fluctuations might indicate the presence of short-run competitive forces. If not indicating competition, instability would at least pose serious regulatory policy questions with

regard to setting rates to achieve adequate revenue. A test designed to isolate some of this unstable traffic was developed and is discussed in Chapter IV.

When this test was applied to the data in the Waybill Sample, only a little over 1% of the traffic was identified as unstable. (This does not include seasonal traffic.) Of the 127 commodities only a handful had non-trivial percentages of "unstable" traffic. It is believed that this small percentage is more the result of the test design than an indication that very little rail demand is unpredictably unstable. The problem is that the smaller the volume of traffic of one commodity on a railroad, and the fewer the shippers, the more the total traffic is subject to individual shipper demand patterns (which may be highly variable). It is also difficult to distinguish the two components of instability, the predictable fluctuations and the unpredictable ones. Thus, this test has proved to be inconclusive in measuring the real extent of demand unpredictability.

INTERPRETATION OF RESULTS

The results presented in this Chapter are interpreted in Chapter VII. Their implications for the procedural alternatives in Chapter VIII are described.

TRAFFIC CHARACTER FROM SPECIALLY PROCESSED
ONE PERCENT WAYBILL SAMPLE FOR 1977 (NOTE 1)

Description	Revenue ($'s)	Tons	Carloads	Average Tons/Carloa (Note 2)
Cotton	331,639	11,818	386	30.6
Wheat	4,181,153	361,707	3,953	91.4
Corn and Sorghum	3,564,243	359,731	4,084	88.3
Barley	627,206	41,624	542	77.0
All Other Grain	475,681	32,371	550	58.9
Soybeans	582,399	72,459	837	86.8
Rice	264,924	18,686	245	76.2
Potatoes	681,131	13,150	348	37.6
Sugar Beets	134,955	32,951	603	54.8
Citrus Fruits	237,455	3,280	69	47.5
Apples	68,328	793	20	39.7
Deciduous Fruits	90,517	1,026	29	35.4
Fresh Vegatables	683,009	7,976	253	31.5
Melons	99,874	1,159	35	33.1
Iron Ore	1,323,118	258,596	2,958	87.8
Non-Ferrous Conc.	981,947	83,319	1,033	80.4
Bauxite Ores	658,551	61,969	694	89.1
Anthracite Coal	151,702	15,288	207	73.8
Metal. Bit. Coal	2,052,960	283,464	3,368	84.05

Description	Revenue ($'s)	Tons	Carloads	Average Tons/Carload (Note 2)
Steam Bit. Coal	13,518,211	2,122,718	24,559	86.8
Lignite	105,920	30,106	338	89.0
Flux Limestone	359,782	64,370	830	77.9
Const. Aggr.	2,045,759	464,992	5,788	80.0
Ind. Sand	1,003,084	109.814	1,364	80.6
Dry Clay	1,407,101	69,497	1,073	64.7
Feldspar	84,481	3,892	52	74.9
Potash Fert.	1,574,973	123,139	1,592	77.7
Phospate Rock	301,911	122,902	1,527	80.6
Fresh Meat	140,729	4,480	86	52.1
Canned Fruits and Veg.	663,137	23,851	445	53.8
Other Canned Foods	2,810,488	106,006	2,416	43.9
Frozen Fruits and Veg.	1,143,511	24,972	548	45.7
Wheat Milling Prod.	1,204,793	85,520	1,972	43.2
Dry Corn Mill Prod.	177,368	10,622	177	60.0
Other Grain Mill Prod.	1,408,877	105,892	2,518	41.9
Wet Corn Mill Prod.	873,273	36,361	604	60.3
Cooked Cereals	475,077	13,378	653	20.4
Refined Sugar	1,035,170	52,026	777	70.9
Malt Liquors	1,737,518	82,404	1,441	57.2
Wines and Brandy	439,604	8,873	185	47.7

?C	Description	Revenue ($'s)	Tons	Carloads	Average Tons/Carloa (Note 2)
?1	Alcoholic Liquors	264,044	8,718	165	52.8
?2	Fats and Oils	1,346,392	66,371	1,115	59.7
?3	Seed, Nut, Veg. Cake	815,007	68,488	960	71.7
?4	Cigars, Cigarettes	178,699	4,145	139	29.8
?5	Textile Prod.	201,863	4,061	233	17.5
?6	Pulpwood Logs	1,027,007	289,300	4,826	60.1
?7	Pulpwood Chips	1,152,759	229,551	3,147	72.9
?8	Lumber	3,999,700	132,575	2,786	47.6
?9	Treated Wood Prod.	187,307	10,513	267	39.5
?0	Wood Posts, etc.	179,778	8,211	209	39.3
?1	Millwork	284,847	7,499	282	26.7
?2	Plywood	2,217,460	72,138	1,464	49.4
?3	Hardwood Stock	42,641	1,491	32	49.4
?4	Wood Particle Board	836,626	29,124	499	58.4
55	Furniture	937,921	11,400	1,316	8.7
56	Woodpulp	834,816	45,590	733	62.8
?7	Newsprint	331,621	16,983	236	72.3
58	Ground Woodpaper	250,717	12,516	214	58.8
59	Printing Paper	1,138,155	46,651	958	48.6
60	Wrapping Paper, etc.	881,509	33,177	752	44.0
61	Pulpboard	3,275,056	171,295	3,137	54.6

PC	Description	Revenue ($'s)	Tons	Carloads	Average Tons/Carload (Note 2)
62	Corrugated Pulpboard	152,771	6,976	155	44.9
63	Sanitary Paper Prod.	1,506,262	42,245	2,254	18.7
64	Paperbd. Boxes etc.	144,046	5,423	243	22.3
65	Food Containers	179,787	4,101	246	16.7
66	Building Paper and Bd.	536,691	20,236	536	37.8
67	Ind. Inorg. Chem	1,366,585	58,532	775	75.4
68	Barium or Calcium	193,383	7,465	129	57.9
69	Sodium Alkalies	551,548	43,319	519	83.3
70	Soda Ash	1,453,088	55,310	612	90.38
71	Industrial Gases	940,089	47,129	597	78.8
72	Ind Org. Chem	3,295,047	143,278	1,852	77.1
73	Sulphuric Acid	319,278	30,538	347	88.0
74	Anhydrous Ammonia	480,457	34,538	497	69.6
75	Superphosphate	1,156,125	99,981	1,268	78.6
76	Agr. Chemicals	1,591,563	106,961	1,454	73.4
77	Plastic Materials	2,179,046	78,107	1,010	77.6
78	Rubber	616,540	26,355	388	67.6
79	Detergents	188,986	6,984	181	38.6
80	Salt	654,931	62,784	823	72.0
81	Carbon Black	298,063	11,155	217	51.4
82	Petroleum Ref. Prod.	1,954,373	114,896	1,741	66.2

SPC	Description	Revenue ($'s)	Tons	Carloads	Average Tons/Carload (Note 2)
83	Petrol. Oil and Grease	515,802	22,381	408	54.7
84	Asphalt	362,856	22,850	298	76.8
85	Liq. Gas, Coal, etc.	932,219	58,228	839	69.4
86	Constr. Mtls.	172,574	10,731	212	50.9
87	Petrol. Coke	575,412	48,134	612	78.4
88	Coke	1,129,714	104,977	2,143	48.8
89	Tires and Tubes	779,489	19,339	930	20.9
90	Plastic Products	304,355	4,562	413	11.1
91	Glass Containers	110,949	2,784	100	27.8
92	Hydraulic Cement	1,209,135	149,832	1,941	77.4
93	Brick or Blocks	424,845	38,865	609	63.8
94	Clay Refractories	290,845	11,346	218	52.2
95	Lime	347,948	39,098	500	78.05
96	Gypsum Bldg. Mtls.	213,579	11,938	205	58.5
97	Mineral Wool	391,483	6,813	618	11.0
98	Pig Iron	108,751	7,991	103	77.4
99	Semi-Fin. Steel	735,936	72,868	910	79.9
100	Mfd. Iron or Steel	2,842,691	172,657	2,607	66.3
101	Iron or Steel Pipe	826,723	24,913	495	50.4
102	Ry. Track Mtl.	247,665	9,518	172	55.5
103	Ferroalloys	135,582	6,646	97	68.5

	Description	Revenue ($'s)	Tons	Carloads	Average Tons/Carloa (Note 2)
4	Prim. Copper Prod.	458,961	18,959	225	84.3
5	Prim. Zinc Prod.	75,650	2,620	40	65.5
6	Prim Alum. Prod.	731,102	22,979	355	64.5
7	Copper Shapes	66,016	1,938	29	66.8
8	Alum Shapes	459,943	14,949	282	53.2
9	Metal Containers	159,783	2,165	191	11.3
0	Farm Machinery	366,573	5,082	285	17.9
1	Heavy Machinery	692,323	10,654	349	30.6
2	Maj. Hsehld. Appliances	1,090,882	12,931	906	14.2
3	Household Appliances	44,447	492	30	16.4
4	Automobiles	3,835,527	45,870	1,907	24.1
5	Other Motor Vehicles	1,457,925	18,346	887	20.6
6	Motor Vehicle Parts	6,676,349	132,473	5,480	24.2
7	Loco. or Car Parts	250,551	5,745	145	39.5
8	Ferrous Scrap	1,912,962	188,200	3,207	58.9
9	Non-Ferrous Scrap	297,929	13,151	285	46.3
0	Textile Waste	115,710	5,373	209	25.7
1	Paper Waste	606,186	42,780	1,057	40.5
2	Chemical Waste	75,938	4,617	66	70.0
3	Empty Containers	308,106	6,970	455	15.3
4	Frt. Forwarder Traf.	132,216	2,285	161	14.2

SPC	Description	Revenue ($'s)	Tons	Carloads	Average Tons/Carload (Note 2)
125	Ship. Assn Traf.	373,710	4,335	355	12.24
126	Misc. Mixed	516,871	8,414	532	15.8
127	All Other	7,912,842	373,612	7,666	48.8
All Rail Traffic		133,305,600	9,332,465	148,007	62.9

Source: A. T. Kearney, Inc., Analysis 1977 One Percent Waybill Sample, TOFC/COFC excluded.

NOTE 1 The actual percent sampling for any SPC commodity group will be less than 1% due to sampling error and exclusion of certain records; see test for details, values given in table are as found in the processed sample, they are not estimates of total rail traffic.

NOTE 2 Average tons per carload shown is slightly different from the quotient of tons and carloads column because of rounding and the weighting of the average by Waybill records, not carloads.

MILEAGE STATISTICS FROM SPECIALLY PROCESSED
ONE PERCENT WAYBILL SAMPLE FOR 1977 (NOTE 1)

'C	Description	Mean	Standard Deviation	Maximum Mileage	Minimum Mileage
1	Cotton	869	782	2,897	15
2	Wheat	388	293	1,639	5
3	Corn and Sorghum	531	411	3,102	5
4	Barley	417	332	1,816	8
5	All Other Grain	481	513	3,187	7
6	Soybeans	370	338	1,906	8
7	Rice	477	567	2,387	2
8	Potatoes	1,719	808	3,185	30
9	Sugar Beets	136	137	1,111	8
0	Citrus Fruits	2,842	345	3,181	1,459
1	Apples	2,900	214	3,358	2,356
2	Deciduous Fruits	2,949	244	3,298	2,195
3	Fresh Vegatables	2,726	567	3,379	75
4	Melons	2,594	561	3.180	1,299
5	Iron Ore	221	176	2,017	14
6	Non-Ferrous Conc.	589	719	3,261	5
7	Bauxite Ores	553	469	2,739	26
8	Anthracite Coal	349	371	3,057	50

SPC	Description	Mean	Standard Deviation	Maximum Mileage	Minimum Mileage
19	Metal. Bit. Coal	323	177	2,434	14
20	Steam Bit. Coal	378	284	2,623	1
21	Lignite	216	203	1,643	17
22	Flux Limestone	222	125	1,285	7
23	Const. Aggr.	201	215	2,606	4
24	Ind. Sand	356	366	3,149	5
25	Dry Clay	854	561	2,990	12
26	Feldspar	685	431	2,460	87
27	Potash Fert.	600	550	2,444	9
28	Phospate Rock	125	268	2,142	1
29	Fresh Meat	908	503	2,143	57
30	Canned Fruits and Veg.	1,112	774	3,209	6
31	Other Canned Foods	919	878	3,291	5
32	Frozen Fruits and Veg.	1,625	877	3,226	9
33	Wheat Milling Prod.	512	368	2,038	1
34	Dry Corn Mill Prod.	636	420	2,151	39
35	Other Grain Mill Prod.	435	384	2,608	5
36	Wet Corn Mill Prod.	781	563	2,622	11
37	Cooked Cereals	598	521	2,760	10
38	Refined Sugar	760	607	2,367	12
39	Malt Liquors	746	452	2,792	7
40	Wines and Brandy	2,281	883	3,376	77

C	Description	Mean	Standard Deviation	Maximum Mileage	Minimum Mileage
1	Alcoholic Liquors	939	754	2,985	23
2	Fats and Oils	685	574	3,132	5
3	Seed, Nut, Veg. Cake	421	416	2,114	16
4	Cigars, Cigarettes	1,089	811	3,049	75
5	Textile Prod.	935	779	3,098	50
6	Pulpwood Logs	137	115	2,205	16
7	Pulpwood Chips	205	193	1,947	2
8	Lumber	1,369	896	3,599	1
9	Treated Wood Prod.	524	482	2,401	2
0	Wood Posts, etc.	711	595	3,314	19
1	Millwork	1,420	930	3,313	43
2	Plywood	1,370	995	3,508	21
3	Hardwood Stock	1,183	832	2,979	170
4	Wood Particle Board	1,183	845	3,450	20
5	Furniture	841	583	3,294	5
6	Woodpulp	820	782	3,420	2
7	Newsprint	662	369	1,726	73
8	Ground Woodpaper	663	446	3,246	9
9	Printing Paper	831	577	3,266	2
0	Wrapping Paper, etc.	921	565	3,197	14
1	Pulpboard	722	427	3,009	10
2	Corrugated Pulpboard	727	532	2,645	32

SPC	Description	Mean	Standard Deviation	Maximum Mileage	Minimum Mileage
63	Sanitary Paper Prod.	705	562	3,257	4
64	Paperbd. Boxes etc.	463	473	2,976	15
65	Food Containers	757	598	3,235	35
66	Building Paper and Bd.	918	593	2,908	7
67	Ind. Inorg. Chem	799	688	3,136	7
68	Barium or Calcium	741	507	3,018	57
69	Sodium Alkalies	373	275	2,095	4
70	Soda Ash	1,213	590	2,302	20
71	Industrial Gases	564	505	2,463	4
72	Ind Org. Chem	790	565	3,053	1
73	Sulphuric Acid	322	295	1,520	3
74	Anhydrous Ammonia	452	284	1,312	5
75	Superphosphate	521	526	2,904	1
76	Agr. Chemicals	508	437	2,895	4
77	Plastic Materials	924	625	3,112	4
78	Rubber	857	573	2,893	5
79	Detergents	659	456	2,956	32
80	Salt	461	220	1,472	47
81	Carbon Black	690	449	2,012	5
82	Petroleum Ref. Prod.	521	481	3,111	2
83	Petrol. Oil and Grease	730	501	2,726	8
84	Asphalt	521	322	1,920	34

SPC	Description	Mean	Standard Deviation	Maximum Mileage	Minimum Mileage
107	Copper Shapes	1,214	592	2,192	47
108	Alum Shapes	1,026	732	2,894	76
109	Metal Containers	767	597	2,987	10
110	Farm Machinery	1,057	599	3,002	18
111	Heavy Machinery	1,111	682	3,135	49
112	Maj. Hsehld. Appliances	896	619	2,860	30
113	Household Appliances	1,099	984	2,380	91
114	Automobiles	1,097	679	3,044	7
115	Other Motor Vehicles	1,020	637	2,667	84
116	Motor Vehicle Parts	663	656	3,088	2
117	Loco. or Car Parts	835	735	2,739	56
118	Ferrous Scrap	213	268	2,874	1
119	Non-Ferrous Scrap	615	585	2,948	2
120	Textile Waste	626	446	2,633	14
121	Paper Waste	432	347	2,835	10
122	Chemical Waste	516	340	1,549	37
123	Empty Containers	713	506	2,752	8
124	Frt. Forwarder Traf.	1,444	533	3,089	401
125	Ship. Assn Traf.	1,996	660	3,245	21
126	Misc. Mixed	1,184	903	3,134	4

C	Description	Mean	Standard Deviation	Maximum Mileage	Minimum Mileage
7	All Other	682	657	3,494	1
1	Rail Traffic	569	591	3,599	1

urce: A. T. Kearney, Inc., Analysis 1977 One Percent Waybill Sample, TOFC/COFC excluded.

TE 1 The actual percent sampling for any SPC commodity group will be less than 1% due to sampling error and exclusion of certain records; see test for details.

RAIL/TRUCK RATE DIFFERENTIALS

		High Truck Cost		Low Truck Cost	
SPC	Description	Mean Rail/Truck Ratio	Std. Dev of Rail/truck Ratio	Mean Rail/Truck Ratio	Std. Dev of Rail/Truck Ratio
1	Cotton	1.11	0.41	1.10	0.41
2	Wheat	2.13	0.85	2.13	0.85
3	Corn and Sorghum	2.32	0.92	2.32	0.93
4	Barley	2.09	0.77	2.09	0.77
5	All Other Grain	1.88	0.84	1.88	0.84
6	Soybeans	2.32	0.88	2.33	0.89
7	Rice	2.15	1.25	2.15	1.25
8	Potatoes	1.20	0.73	1.20	0.74
9	Sugar Beets	1.47	0.88	1.47	0.88
10	Citrus Fruits	1.18	0.09	1.18	0.09
11	Apples	1.03	0.09	1.03	0.09
12	Deciduous Fruits	1.02	0.10	1.00	0.08
13	Fresh Vegatables	0.95	0.19	0.95	0.20
14	Melons	1.03	0.29	1.03	0.30
15	Iron Ore	3.68	0.80	3.76	0.78
16	Non-Ferrous Conc.	2.55	1.14	2.55	1.14

SPC	Description	High Truck Cost: Mean Rail/Truck Ratio	High Truck Cost: Std. Dev of Rail/truck Ratio	Low Truck Cost: Mean Rail/Truck Ratio	Low Truck Cost: Std. Dev of Rail/Truck Ratio
17	Bauxite Ores	2.90	1.19	2.91	1.19
18	Anthracite Coal	2.15	0.64	2.41	0.79
19	Metal. Bit. Coal	3.60	1.00	3.61	1.00
20	Steam Bit. Coal	3.73	1.28	3.73	1.28
21	Lignite	2.69	1.50	2.69	1.50
22	Flux Limestone	2.36	0.76	2.36	0.76
23	Const. Aggr.	2.66	2.29	2.66	2.29
24	Ind. Sand	2.33	1.05	2.33	1.05
25	Dry Clay	2.65	1.19	2.66	1.19
26	Feldspar	2.99	1.07	2.99	1.07
27	Potash Fert.	2.68	2.49	2.68	2.49
28	Phospate Rock	1.98	0.96	2.02	0.99
29	Fresh Meat	1.26	0.31	1.26	0.31
30	Canned Fruits and Veg.	1.07	0.37	1.33	0.45
31	Other Canned Foods	1.31	0.88	1.31	0.89
32	Frozen Fruits and Veg.	1.38	0.42	1.38	0.42
33	Wheat Milling Prod.	1.65	0.76	1.65	0.76
34	Dry Corn Mill Prod.	1.99	0.88	1.98	0.88

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SPC	Description	High Truck Cost: Mean Rail/Truck Ratio	High Truck Cost: Std. Dev of Rail/truck Ratio	Low Truck Cost: Mean Rail/Truck Ratio	Low Truck Cost: Std. Dev of Rail/Truck Ratio
35	Other Grain Mill Prod.	1.58	1.28	1.58	1.28
36	Wet Corn Mill Prod.	1.98	1.01	1.99	1.01
37	Cooked Cereals	1.19	0.48	1.19	0.48
38	Refined Sugar	2.83	1.68	2.85	1.67
39	Malt Liquors	1.56	0.67	1.57	0.67
40	Wines and Brandy	1.55	0.37	1.55	0.37
41	Alcoholic Liquors	1.51	0.61	1.51	0.61
42	Fats and Oils	1.84	0.81	1.84	0.81
43	Seed, Nut, Veg. Cake	2.46	0.98	2.46	0.98
44	Cigars, Cigarettes	1.33	0.46	1.33	0.46
45	Textile Prod.	1.65	0.58	1.65	0.57
46	Pulpwood Logs	3.57	7.77	3.56	7.77
47	Pulpwood Chips	3.37	3.21	3.37	3.21
48	Lumber	1.89	1.90	1.89	1.91
49	Treated Wood Prod.	2.07	0.89	2.07	0.89
50	Wood Posts, etc.	2.06	0.88	2.06	0.88
51	Millwork	1.61	0.48	1.61	0.48
52	Plywood	1.81	0.46	1.81	0.46

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SPC	Description	High Truck Cost: Mean Rail/Truck Ratio	High Truck Cost: Std. Dev of Rail/truck Ratio	Low Truck Cost: Mean Rail/Truck Ratio	Low Truck Cost: Std. Dev of Rail/Truck Ratio
53	Hardwood Stock	1.75	0.58	1.74	0.60
54	Wood Particle Board	2.00	0.57	2.00	0.57
55	Furniture	1.73	0.73	1.74	0.74
56	Woodpulp	2.91	4.00	2.92	4.01
57	Newsprint	2.50	1.83	2.50	1.83
58	Ground Woodpaper	4.99	8.49	5.07	8.60
59	Printing Paper	1.90	1.89	1.91	1.91
60	Wrapping Paper, etc.	1.70	0.56	1.70	0.56
61	Pulpboard	2.12	1.13	2.13	1.13
62	Corrugated Pulpboard	2.24	1.60	2.21	1.58
63	Sanitary Paper Prod.	1.53	0.79	1.53	0.79
64	Paperbd. Boxes etc.	1.43	1.42	1.44	1.44
65	Food Containers	1.97	3.32	1.97	3.33
66	Building Paper and Bd.	1.54	0.50	1.54	0.50
67	Ind. Inorg. Chem	2.59	2.79	2.59	2.79
68	Barium or Calcium	1.97	0.74	1.96	0.72
69	Sodium Alkalies	2.79	3.80	2.79	3.80
70	Soda Ash	3.88	1.25	3.88	1.25

SPC	Description	High Truck Cost: Mean Rail/Truck Ratio	High Truck Cost: Std. Dev of Rail/truck Ratio	Low Truck Cost: Mean Rail/Truck Ratio	Low Truck Cost: Std. Dev of Rail/Truck Ratio
71	Industrial Gases	2.36	2.41	2.28	3.26
72	Ind Org. Chem	2.38	0.95	2.39	0.95
73	Sulphuric Acid	2.41	2.82	2.41	2.83
74	Anhydrous Ammonia	2.16	0.98	2.16	0.98
75	Superphosphate	2.79	1.34	2.79	1.34
76	Agr. Chemicals	2.51	2.26	2.51	2.26
77	Plastic Materials	2.91	1.77	2.91	1.77
78	Rubber	1.98	0.66	1.99	0.66
79	Detergents	1.31	0.59	1.31	0.59
80	Salt	2.88	3.22	2.89	3.26
81	Carbon Black	2.51	1.05	2.51	1.05
82	Petroleum Ref. Prod.	4.70	9.40	4.71	9.41
83	Petrol. Oil and Grease	1.73	0.65	1.73	0.65
84	Asphalt	2.29	0.80	2.29	0.80
85	Liq. Gas, Coal, etc.	2.20	2.16	2.21	2.18
86	Constr. Mtls.	1.71	0.45	1.71	0.45
87	Petrol. Coke	2.82	0.97	2.82	0.97
88	Coke	2.32	0.78	2.32	0.79

SPC	Description	High Truck Cost: Mean Rail/Truck Ratio	High Truck Cost: Std. Dev of Rail/truck Ratio	Low Truck Cost: Mean Rail/Truck Ratio	Low Truck Cost: Std. Dev of Rail/Truck Ratio
89	Tires and Tubes	1.45	0.51	1.45	0.51
90	Plastic Products	1.53	0.59	1.53	0.59
91	Glass Containers	2.10	2.29	2.11	2.30
92	Hydraulic Cement	2.47	0.93	2.47	0.93
93	Brick or Blocks	1.94	0.55	1.95	0.55
94	Clay Refractories	1.74	0.45	1.75	0.45
95	Lime	2.19	0.95	2.19	0.96
96	Gypsum Bldg. Mtls.	1.82	0.59	1.83	0.59
97	Mineral Wool	1.55	0.75	1.55	0.75
98	Pig Iron	2.87	0.97	2.87	0.97
99	Semi-Fin. Steel	1.28	0.63	1.28	0.63
100	Mfd. Iron or Steel	1.28	0.51	1.28	0.51
101	Iron or Steel Pipe	1.27	0.47	1.27	0.47
102	Ry. Track Mtl.	2.30	0.92	2.30	0.92
103	Ferroalloys	2.25	0.88	2.25	0.88
104	Prim. Copper Prod.	2.04	0.60	2.04	0.60
105	Prim. Zinc Prod.	1.98	0.55	1.98	0.55
106	Prim Alum. Prod.	2.05	0.59	2.05	0.89

SPC	Description	High Truck Cost: Mean Rail/Truck Ratio	High Truck Cost: Std. Dev of Rail/truck Ratio	Low Truck Cost: Mean Rail/Truck Ratio	Low Truck Cost: Std. Dev of Rail/Truck Ratio
107	Copper Shapes	1.93	0.74	1.93	0.75
108	Alum Shapes	1.95	0.76	1.95	0.76
109	Metal Containers	1.66	0.81	1.66	0.81
110	Farm Machinery	0.81	0.29	1.03	0.38
111	Heavy Machinery	1.37	0.61	1.38	0.61
112	Maj. Hsehld. Appliances	1.50	0.49	1.50	0.49
113	Household Appliances	1.32	0.62	1.32	0.62
114	Automobiles	4.04	1.24	4.06	1.24
115	Other Motor Vehicles	0.88	0.29	0.88	0.29
116	Motor Vehicle Parts	1.51	1.27	1.51	1.27
117	Loco. or Car Parts	1.84	0.79	1.84	0.79
118	Ferrous Scrap	0.99	0.78	0.99	0.78
119	Non-Ferrous Scrap	1.37	0.6	1.37	0.62
120	Textile Waste	1.65	1.64	1.66	1.68
121	Paper Waste	1.44	1.25	1.45	1.25
122	Chemical Waste	2.29	1.05	2.29	1.05
123	Empty Containers	1.44	0.65	1.44	0.65
124	Frt. Forwarder Traf.	2.11	0.40	2.11	0.40

		High Truck Cost		Low Truck Cost	
SPC	Description	Mean Rail/Truck Ratio	Std. Dev of Rail/truck Ratio	Mean Rail/Truck Ratio	Std. Dev of Rail/Truck Ratio
125	Ship. Assn Traf.	1.99	0.60	2.00	0.60
126	Misc. Mixed	1.72	1.08	1.73	1.09
127	All Other	1.91	1.31		
All Rail Traffic		2.49	2.43		

Source: A. T. Kearney, Inc., Analysis 1977 One Percent Waybill Sample, TOFC/COFC excluded.

NOTE 1 The mean of the rail/truck ratios is defined as the mean of all carloads for the ratio of shipper's cost for truck service in comparison with rail revenues (or Rail Form A fully allocated costs whenever they exceed rail revenue). Truck service types employed for each carload ratio is the one which is lowest among those eligible to haul the freight. Generally, this will be owner operators for agricultural products and contract carriers for regulated commodities.

	TOTAL CAR LOADS	FLAG 1	FLAG 9	ORGRP FLAG 2	DSTPR FLAG 2	BOTH FLAG 2	FLAG 11	FLAG 5
87-Petroleum Coke	612	96.08	97.39	9.80	11.11	12.09	2.12	0.00
88-Coke from Coal	2143	94.31	95.15	7.65	7.65	9.15	0.00	0.00
89-Tires & Tubes, Rubber	930	74.73	6.45	37.63	34.19	40.75	0.86	3.23
90-Plastic Products	413	71.19	14.77	54.96	53.03	57.38	2.42	0.00
91-Glass Containers	100	72.00	49.00	63.00	70.00	70.00	0.00	50.00
92-Hydraulic Cement	1941	96.39	97.68	16.38	15.97	18.29	0.05	38.07
93-Brik/Bloc, Clay/Shale	607	96.05	98.19	57.83	57.50	65.90	0.82	57.83
94-Clay Refractories	218	94.04	81.19	58.72	59.63	62.84	8.26	67.43
95-Lime	500	89.40	98.00	21.80	19.60	24.00	5.80	53.40
96-Gypsum Bldg Materials	205	83.41	39.51	47.32	43.90	51.71	0.49	36.10
97-Mineral Wool	618	77.99	51.29	44.34	38.19	47.90	0.16	47.90
98-Pig Iron	103	97.09	66.99	35.92	31.07	37.86	0.00	69.90
99-Semi-Finished Steel	910	44.95	12.31	7.69	8.02	9.89	3.41	67.91
100-Mnfc Iron or Steel	2607	30.11	3.26	24.66	26.66	31.48	1.27	67.05
101-Iron/Stl Pipe,Tube/Fittng	495	49.09	0.81	49.09	48.89	55.56	8.08	54.55
102-Railway Track Material	172	71.51	26.16	58.14	61.05	63.37	0.00	43.02
103-Ferroalloys	97	88.66	26.80	58.76	51.55	58.76	1.03	59.79
104-Primary Copper Pro	225	68.44	1.33	35.56	34.22	37.78	13.33	56.89
105-Primary Zinc Pro	40	92.50	7.50	90.00	77.50	90.00	0.00	25.00
106-Primary Aluminum Pro	355	88.17	1.69	35.49	33.80	39.44	0.00	29.01
107-Bras/Brz/Cpr BasicShapes	29	86.21	3.45	48.28	48.28	48.28	0.00	68.97
108-Aluminum Basic Shapes	282	84.40	1.77	26.24	24.11	28.72	0.00	63.83
109-Metal Containers	191	74.87	9.95	55.50	53.93	57.59	2.62	50.26
110-Farm Machinery	285	15.09	0.00	68.07	68.77	77.54	0.00	0.00
111-Heavy Machinery	349	25.21	3.44	75.93	77.94	80.23	0.86	0.00
112-Maj Hsehld Appliances	906	54.97	6.18	34.33	33.44	38.74	1.66	0.00
113-Household Appliances	30	43.33	0.00	43.33	36.67	43.33	10.00	0.00
114-Psngr Cars, Assembled	1907	95.60	10.33	13.06	14.79	16.78	0.63	0.00
115-Vhcles-Asm Exc PasCars	887	0.79	0.00	19.17	20.41	21.65	0.11	0.00
116-Motor Vehicle Parts	5480	44.16	1.39	4.76	4.71	6.04	0.40	0.11
117-Loco/Railway Car Pts	145	46.90	0.69	57.93	71.03	71.72	0.00	0.00
118-Iron or Steel Scrap	3207	19.55	8.92	17.52	19.77	23.11	0.03	46.34
119-Non-Ferrous Mtl Scrap	285	50.88	22.46	62.11	61.75	65.61	0.00	35.44
120-Textile Waste/Scrap	209	86.12	80.38	76.08	73.21	80.86	0.48	69.86
121-Paper Waste/Scrap	1057	67.83	57.91	50.99	55.25	59.79	0.00	52.89
122-Chem/Petro Waste	66	81.82	25.76	54.55	51.52	54.55	0.00	39.39
123-Ship Cont, R'd Empty	455	65.93	71.43	60.66	62.20	65.49	0.00	9.89
124-Freight Forwarder Traf	161	93.79	94.41	22.36	19.88	22.98	0.00	0.00
125-ShipAssoc Traffic	355	94.08	88.73	19.72	20.56	25.07	0.00	0.00
126-Misc Mixed Shipments	532	73.68	49.06	42.11	43.42	49.06	0.00	0.00
127-All Other	7666	73.01	37.32	41.43	42.08	48.12	0.00	32.10
Total SPC Carloads = 147986								
		81.33	62.46	22.47	21.89	25.96	5.56	29.44

Flag 1 : Transportation Rate Differential Test

Flag 2 : Intramodal Competition Test

Flag 5 : Demand Stability Test

Flag 11: Market Share Trend Test

Flag 9 · Rate/Service Differential Test

Summary Statistics For Tests of Non-Competitiveness

	TOTAL CAR LOADS	FLAG 1	FLAG 9	ORGRP FLAG 2	DSTRK FLAG 2	BOTH FLAG 2	FLAG 11	FLAG 5
44-Cig/Cigaret/Manu Tobac	139	71.94	0.09	44.60	48.92	53.96	0.09	0.00
45-Textile Products	233	74.25	9.44	49.79	48.50	50.64	1.29	0.00
46-Pulpwood Logs	4826	74.31	98.26	2.57	2.92	3.44	1.08	51.35
47-Pulpwood Chips	3147	97.87	99.75	2.83	2.83	3.11	1.78	56.66
48-Lumber	2786	88.16	69.10	40.45	38.98	50.68	2.80	39.09
49-Treated Wood Products	267	90.64	66.29	50.56	49.81	55.06	1.12	22.85
50-Wood Posts/Poles/Piling	209	79.90	58.37	60.77	62.20	64.11	3.35	44.02
51-Millwk & Oth Lumber Pro	282	88.30	71.63	77.30	74.82	80.14	0.71	34.40
52-Plywood or Veneer	1464	91.39	56.63	43.10	41.53	50.41	2.39	51.71
53-Hardwd Stock & Floor	32	93.75	78.13	93.75	93.75	93.75	0.00	43.75
54-Wood Particle Board	499	93.39	68.54	63.33	59.52	68.74	0.60	44.49
55-Furniture	1316	87.92	34.35	53.04	48.94	59.35	0.64	0.00
56-Woodpulp & Other Pulps	733	85.13	30.56	25.92	27.69	30.01	11.32	75.17
57-Newsprint Paper	236	88.98	1.69	34.32	31.36	37.71	8.47	64.41
58-Ground Wood Paper	214	82.71	8.88	37.85	37.38	41.59	6.07	49.53
59-Printing Paper	958	84.76	11.80	46.03	42.17	51.25	2.92	74.27
60-Wrapping Paper/Pap.Bags	752	89.23	15.56	56.25	55.19	63.70	6.91	66.62
61-Pulpboard Exc. Corrugated	3137	90.40	18.74	30.38	28.28	36.31	3.22	68.06
62-Pulpboard, Corrugated	155	87.10	16.77	66.45	66.15	69.03	1.29	40.00
63-Sanitary Paper Pro	2254	77.60	36.25	31.37	30.30	38.64	5.15	67.48
64-Paperboard Box/Contain	243	63.79	12.76	65.02	62.55	66.26	2.47	67.08
65-Food Ct/FbCan,Drum/Tube	246	81.71	36.18	64.63	65.04	68.29	5.69	73.98
66-Bldg Paper/Bldg Board	536	81.53	56.90	57.09	52.99	59.89	2.05	65.30
67-Indus Inorganic Chems	775	82.19	25.03	53.03	50.19	55.23	0.77	58.19
68-Barium,Calcium Cmpds	129	72.09	27.13	71.32	59.69	71.32	0.78	85.27
69-Sodium Alkalies	519	88.44	35.26	39.50	37.76	42.58	2.12	82.47
70-Soda Ash	612	95.92	92.16	12.09	10.13	13.24	0.00	93.79
71-Industrial Gases	597	67.17	40.37	36.68	37.19	40.87	5.36	79.40
72-Indus Organic Chems	1852	79.75	47.35	30.94	31.70	37.15	2.70	75.43
73-Sulphuric Acid	347	83.00	65.13	38.33	33.43	42.07	3.17	42.36
74-Anhydrous Ammonia	497	77.26	75.25	35.61	33.60	36.02	3.92	41.45
75-Superphosphate	1268	92.11	75.00	32.65	22.79	33.99	0.47	19.48
76-Agricul Chems & Fertil	1454	92.43	90.03	53.30	48.56	56.88	1.24	39.68
77-Plastic Materials	1010	88.51	36.44	44.85	43.07	52.48	3.37	75.35
78-Rubber, Natural/Syn	388	77.06	7.99	39.18	41.24	46.91	2.06	35.82
79-Detergents/Oth Clean Prep	181	55.80	3.87	44.75	47.51	49.72	0.00	72.38
80-Salt, Rock and Common	823	95.75	96.35	22.48	21.51	25.39	0.97	30.98
81-Carbon Blacks	217	93.09	86.18	53.46	53.46	61.29	7.37	76.50
82-Petro Refining Pro	1741	81.91	9.76	27.23	24.07	30.79	0.52	32.80
83-Petro/LubOils/Greases	408	80.64	12.75	50.00	45.83	53.43	0.25	38.73
84-Asphalt Pitches/Tars	298	91.95	28.86	28.19	28.19	29.53	0.67	13.76
85-LiqGases/Coal/Petro	839	91.06	26.34	32.18	30.75	38.14	1.19	32.06
86-CnstrMt/Asphalt/Asbestos	217	87.26	9.91	63.68	61.79	67.45	0.00	0.00

Flag 1 · Transportation Rate Differential Test

Flag 2 · Intramodal Competition Test

Flag 5 : Demand Stability Test

Flag 11· Market Share Trend Test

Flag 9 : Rate/Service Differential Test

Summary Statistics For Tests of Non-Competitiveness

	TOTAL CAR LOADS	FLAG 1	FLAG 9	ORGRP FLAG 2	DSTRR FLAG 2	BOTH FLAG 2	FLAG 11	FLAG 5
1-Cotton	386	49.48	16.32	44.82	48.45	51.81	51.04	5.96
2-Wheat	3953	74.55	74.07	8.65	9.99	11.46	40.10	0.00
3-Corn & Sorghum Grains	4084	91.41	91.53	18.90	19.83	22.65	28.72	0.00
4-Barley	542	83.21	80.07	14.58	13.28	16.05	12.18	0.00
5-Grain, All Other	550	88.55	97.91	42.91	44.00	47.27	23.45	7.45
6-Soybeans	837	90.92	86.38	27.72	32.74	34.53	35.48	0.00
7-Rice	245	81.63	91.02	20.41	21.22	23.67	14.29	56.33
8-Potatoes, Other Than Sweet	348	58.33	59.20	38.79	33.91	41.38	12.93	0.00
9-Sugar Beets	603	70.15	96.68	1.33	2.49	2.49	24.71	0.00
10-Citrus Fruits	69	91.30	91.30	31.88	30.43	36.23	47.83	0.00
11-Apples	20	30.00	25.00	30.00	30.00	30.00	0.00	0.00
12-Deciduous Fruits	29	44.83	41.38	41.38	48.28	48.28	20.69	0.00
13-Fresh Vegetables	253	29.64	28.46	27.67	29.25	31.23	7.11	0.00
14-Melons	35	37.14	25.71	60.00	71.43	71.43	8.57	0.00
15-Iron Ore	2958	99.22	99.22	4.50	4.19	4.53	2.67	0.00
16-Non-Ferrous Concentrates	1033	94.77	48.69	19.85	16.75	21.20	0.39	17.62
17-Cal/Act. Bauxite Ores	694	94.81	98.85	18.73	17.72	19.31	0.00	0.00
18-Anthracite Coal	207	99.52	99.52	17.87	15.46	18.36	0.00	95.65
19-BitCoal Metallurgical	3368	98.78	98.81	2.73	2.23	3.00	1.66	15.86
20-BitCoal: Fuel,Steam	24540	97.67	98.95	3.20	2.09	3.97	11.60	10.75
21-Lignite, Prepared or Raw	338	75.15	100.00	2.66	2.66	2.66	0.00	0.00
22-Limestone & Dolomite	830	98.31	99.64	7.11	5.78	7.23	0.00	21.57
23-Construction Aggregates	5788	97.20	99.64	7.86	6.50	8.86	0.05	22.17
24-Industrial Sand	1364	89.30	97.51	19.13	17.30	21.63	2.49	6.52
25-Clays,Dry Exc. Fire Clay	1073	95.06	97.95	28.33	24.32	32.25	0.00	17.52
26-Feldspar	52	88.46	90.38	65.38	59.62	65.38	0.00	19.23
27-Potash Fertilizers	1592	84.48	98.05	25.19	19.72	26.26	0.25	24.56
28-Phosphate Rock	1527	88.08	97.77	0.98	0.85	0.98	0.00	1.11
29-Fr Meats & Packnghse Pro	86	56.98	0.00	69.77	77.91	77.91	0.00	50.00
30-Can/Pres Fruits & Veges	445	74.83	17.53	56.63	54.16	58.88	2.25	53.03
31-Oth Foodstuf Ca/Ps/Pp	2416	61.88	20.82	37.96	40.11	47.56	3.39	45.45
32-Froz Fruits Veges	548	77.92	35.04	40.69	37.59	43.80	3.83	51.82
33-Wheat Flour Milling Pro	1972	76.77	60.45	29.16	31.80	37.27	1.47	50.30
34-Dry Corn Milling Pro	177	87.01	61.02	57.06	57.63	65.54	0.00	50.28
35-Other Grain Mill Pro	2518	67.16	41.14	32.37	32.05	37.57	1.83	54.01
36-Wet Corn Milling Pro	604	83.61	59.11	45.86	50.66	54.80	2.98	71.85
37-Cereal Prep (Cooked)	653	55.28	2.76	24.96	26.49	32.16	2.45	62.02
38-Sugar: Ref/Cane/Beet	777	85.59	43.89	29.21	26.77	35.52	0.64	38.87
39-Malt Liquors	1441	76.96	24.77	27.76	24.50	31.51	0.00	51.42
40-Wines and Brandy	185	89.19	79.46	45.95	44.32	51.35	2.16	3.78
41-Alcoholic Liquors	165	70.30	10.91	67.88	65.45	73.33	1.82	61.82
42-Commercial Fats & Oils	1115	76.05	31.84	48.16	49.87	55.52	0.54	60.81
43-Seed/Nut/Vege Cake,Meal	960	95.52	47.71	41.15	42.19	49.27	0.52	61.67

Flag 1 : Transportation Rate Differential Test

Flag 2 : Intramodal Competition Test

Flag 5 Demand Stability Test

Flag 11· Market Share Trend Test

Flag 9 : Rate/Service Differential Test

SUMMARY STATISTICS FOR REVENUE/VARIABLE COST VALUES BY SPC GROUP

SPC	Description	Mean Ratio	Standard Deviation of Ratio
1	Cotton	1.22	0.47
2	Wheat	1.58	0.77
3	Corn and Sorghum	1.12	0.47
4	Barley	1.74	0.70
5	All Other Grain	1.23	0.50
6	Soybeans	1.33	0.52
7	Rice	1.23	0.70
8	Potatoes	1.31	0.93
9	Sugar Beets	0.77	0.31
10	Citrus Fruits	1.13	0.11
11	Apples	1.10	0.11
12	Deciduous Fruits	1.08	0.09
13	Fresh Vegatables	1.04	0.33
14	Melons	1.14	0.11
15	Iron Ore	1.74	0.57
16	Non-Ferrous Conc.	1.25	0.57
17	Bauxite Ores	1.29	0.57
18	Anthracite Coal	1.27	0.33
19	Metal. Bit. Coal	1.51	0.44

SPC	Description	Mean Ratio	Standard Deviation of Ratio
20	Steam Bit. Coal	1.25	0.45
21	Lignite	0.73	0.39
22	Flux Limestone	1.08	0.32
23	Const. Aggr.	0.97	0.74
24	Ind. Sand	1.27	0.41
25	Dry Clay	1.47	0.48
26	Feldspar	2.11	0.54
27	Potash Fert.	1.32	1.82
28	Phospate Rock	0.65	0.56
29	Fresh Meat	1.35	0.41
30	Canned Fruits and Veg.	1.10	0.37
31	Other Canned Foods	1.10	0.92
32	Frozen Fruits and Veg.	1.27	0.44
33	Wheat Milling Prod.	0.94	0.46
34	Dry Corn Mill Prod.	1.24	0.53
35	Other Grain Mill Prod.	0.95	0.53
36	Wet Corn Mill Prod.	1.43	0.64
37	Cooked Cereals	1.11	0.34
38	Refined Sugar	1.55	0.61
39	Malt Liquors	1.25	0.36
40	Wines and Brandy	1.07	0.27

SPC	Description	Mean Ratio	Standard Deviation of Ratio
41	Alcoholic Liquors	1.31	0.44
42	Fats and Oils	1.43	0.70
43	Seed, Nut, Veg. Cake	1.33	0.46
44	Cigars, Cigarettes	1.26	0.25
45	Textile Prod.	1.27	0.33
46	Pulpwood Logs	1.09	2.07
47	Pulpwood Chips	1.13	1.10
48	Lumber	1.45	1.86
49	Treated Wood Prod.	1.28	0.59
50	Wood Posts, etc.	1.43	0.56
51	Millwork	1.02	0.46
52	Plywood	1.37	0.39
53	Hardwood Stock	1.25	0.35
54	Wood Particle Board	1.50	0.39
55	Furniture	1.18	0.42
56	Woodpulp	2.34	3.61
57	Newsprint	2.35	2.22
58	Ground Woodpaper	4.69	7.94
59	Printing Paper	1.68	2.00
60	Wrapping Paper, etc.	1.35	0.41
61	Pulpboard	1.45	0.77

SPC	Description	Mean Ratio	Standard Deviation of Ratio
62	Corrugated Pulpboard	1.30	0.40
63	Sanitary Paper Prod.	1.14	0.79
64	Paperbd. Boxes etc.	1.23	1.53
65	Food Containers	1.46	2.26
66	Building Paper and Bd.	1.23	0.35
67	Ind. Inorg. Chem	1.92	2.01
68	Barium or Calcium	1.86	0.70
69	Sodium Alkalies	2.22	3.23
70	Soda Ash	1.77	0.43
71	Industrial Gases	2.29	3.25
72	Ind Org. Chem	1.78	0.82
73	Sulphuric Acid	1.80	2.46
74	Anhydrous Ammonia	1.48	0.50
75	Superphosphate	1.40	0.55
76	Agr. Chemicals	1.59	1.24
77	Plastic Materials	1.96	1.23
78	Rubber	1.77	0.78
79	Detergents	1.32	0.48
80	Salt	1.42	1.21
81	Carbon Black	1.71	0.74
82	Petroleum Ref. Prod.	2.76	4.49

SPC	Description	Mean Ratio	Standard Deviation of Ratio
83	Petrol. Oil and Grease	1.37	0.50
84	Asphalt	1.65	0.53
85	Liq. Gas, Coal, etc.	1.66	2.33
86	Constr. Mtls.	1.55	0.43
87	Petrol. Coke	1.37	0.42
88	Coke	1.21	0.42
89	Tires and Tubes	1.23	0.34
90	Plastic Products	1.27	0.39
91	Glass Containers	1.34	0.49
92	Hydraulic Cement	1.34	0.60
93	Brick or Blocks	1.19	0.29
94	Clay Refractories	1.43	0.35
95	Lime	1.33	0.50
96	Gypsum Bldg. Mtls.	1.54	0.34
97	Mineral Wool	1.18	0.35
98	Pig Iron	1.72	0.50
99	Semi-Fin. Steel	1.39	0.52
100	Mfd. Iron or Steel	1.76	0.58
101	Iron or Steel Pipe	1.59	0.67
102	Ry. Track Mtl.	2.25	1.11
103	Ferroalloys	1.67	0.56

SPC	Description	Mean Ratio	Standard Deviation of Ratio
104	Prim. Copper Prod.	1.98	0.64
105	Prim. Zinc Prod.	1.75	0.42
106	Prim Alum. Prod.	1.89	0.60
107	Copper Shapes	1.66	0.48
108	Alum Shapes	1.69	0.57
109	Metal Containers	1.31	0.39
110	Farm Machinery	1.55	0.39
111	Heavy Machinery	2.08	1.02
112	Maj. Hsehld. Appliances	1.55	0.53
113	Household Appliances	1.76	0.59
114	Automobiles	1.92	0.47
115	Other Motor Vehicles	1.75	0.44
116	Motor Vehicle Parts	1.71	0.90
117	Loco. or Car Parts	2.11	1.11
118	Ferrous Scrap	1.41	0.87
119	Non-Ferrous Scrap	1.51	0.66
120	Textile Waste	1.14	1.47
121	Paper Waste	1.21	1.04
122	Chemical Waste	1.71	0.73
123	Empty Containers	1.11	0.71
124	Frt. Forwarder Traf.	0.88	0.22

SPC	Description	Mean Ratio	Standard Deviation of Ratio
125	Ship. Assn Traf.	0.90	0.46
126	Misc. Mixed	1.28	0.71
127	All Other	1.31	0.98
All Rail Traffic		1.38	1.17

Source: A. T. Kearney, Inc., Analysis 1977 One Percent Waybill Sample, TOFC/COFC excluded.

Summary Statistics For Revenue/Variable Cost Ratio Tests

	TOTAL CAR LOADS	R/V 1.3 FLAG 7	R/V 1.4 FLAG 7	R/V 1.5 FLAG 7	R/V 1.6 FLAG 7	R/V 1.7 FLAG 7	R/V 1.8 FLAG 7
1-Cotton	386	42.49	34.29	24.61	15.28	9.84	7.25
2-Wheat	3953	59.25	54.14	48.27	42.63	38.50	35.21
3-Corn & Sorghum Grains	4084	26.86	20.62	15.67	12.22	9.35	7.44
4-Barley	542	69.56	62.55	58.30	52.95	49.63	44.10
5-Grain, All Other	550	41.09	32.91	25.45	18.36	12.91	9.09
6-Soybeans	837	46.00	35.01	26.88	23.54	21.15	17.56
7-Rice	245	41.22	28.98	26.53	24.19	22.86	21.63
8-Potatoes, Other Than Sweet	348	25.86	15.80	9.20	6.32	5.75	5.46
9-Sugar Beets	603	1.33	0.83	0.50	0.50	0.50	0.50
10-Citrus Fruits	69	4.35	2.90	1.45	0.00	0.00	0.00
11-Apples	20	5.00	0.00	0.00	0.00	0.00	0.00
12-Deciduous Fruits	29	0.00	0.00	0.00	0.00	0.00	0.00
13-Fresh Vegetables	253	2.77	1.19	1.19	0.40	0.40	0.40
14-Melons	35	11.43	2.86	0.00	0.00	0.00	0.00
15-Iron Ore	2958	82.62	75.96	68.97	58.18	47.67	40.64
16-Non-Ferrous Concentrates	1033	44.34	38.04	30.98	23.14	16.75	13.46
17-Cal/Act. Bauxite Ores	694	45.39	40.06	29.25	22.48	19.74	15.71
18-Anthracite Coal	207	49.28	33.82	26.57	14.98	11.59	6.28
19-BitCoal Metallurgical	3368	68.56	60.45	51.90	42.40	34.12	27.29
20-BitCoal: Fuel,Steam	24540	45.84	37.41	28.27	21.50	16.22	12.31
21-Lignite, Prepared or Raw	338	11.83	5.92	2.37	0.59	0.00	0.00
22-Limestone & Dolomite	830	19.52	12.41	9.64	5.30	3.49	2.53
23-Construction Aggregates	5788	14.62	11.23	8.00	5.75	4.18	3.28
24-Industrial Sand	1364	44.35	35.85	28.45	20.89	14.44	10.19
25-Clays,Dry Exc. Fire Clay	1073	63.56	54.52	43.80	36.25	29.54	22.18
26-Feldspar	52	94.23	92.31	88.46	84.62	82.69	76.92
27-Potash Fertilizers	1592	38.82	32.54	27.32	23.68	19.91	16.21
28-Phosphate Rock	1527	23.31	6.22	3.47	2.92	2.29	1.64
29-Fr Meats & Packnghse Pro	86	55.81	40.70	33.72	24.42	16.28	6.98
30-Can/Pres Fruits & Veges	445	25.84	16.85	10.79	6.97	4.04	2.47
31-Oth Foodstuf Ca/Ps/Pp (	2416	25.95	18.75	13.33	9.02	5.71	3.64
32-Froz Fruits Veges	548	46.33	28.83	21.17	14.78	12.04	8.39
33-Wheat Flour Milling Pro	1972	20.49	14.50	10.14	7.40	5.43	3.85
34-Dry Corn Milling Pro	177	42.37	33.90	28.25	22.03	17.51	13.56
35-Other Grain Mill Pro	2518	22.00	17.04	13.26	9.53	6.79	5.40
36-Wet Corn Milling Pro	604	54.64	46.03	37.42	33.11	26.32	22.19
37-Cereal Prep (Cooked)	653	26.33	18.53	11.33	6.58	4.59	2.14
38-Sugar: Ref/Cane/Beet	777	60.75	53.54	45.95	40.41	34.62	29.06
39-Malt Liquors	1441	42.33	30.05	20.68	13.60	8.81	5.20
40-Wines and Brandy	185	18.38	11.89	7.57	4.32	2.70	2.16
41-Alcoholic Liquors	165	50.30	38.79	30.91	26.06	20.00	13.94
42-Commercial Fats & Oils	1115	56.23	49.60	42.96	37.04	32.83	26.55
43-Seed/Nut/Vege Cake,Meal	960	53.02	43.23	34.58	25.52	17.29	11.77

Flag 7: Revenue/Variable Cost Ratio Test

Summary Statistics for Revenue/Variable Cost Ratio Tests

	TOTAL CAR LOADS	R/V 1.3 FLAG 7	R/V 1.4 FLAG 7	R/V 1.5 FLAG 7	R/V 1.6 FLAG 7	R/V 1.7 FLAG 7	R/V 1.8 FLAG 7
44-Cig/Cigaret/Manu Tobac	139	45.32	30.22	20.14	7.91	5.04	0.00
45-Textile Products	233	38.63	31.33	23.61	18.88	10.30	4.72
46-Pulpwood Logs	4826	6.45	6.09	4.54	3.98	3.69	3.54
47-Pulpwood Chips	3147	23.61	15.19	10.55	7.59	5.34	3.46
48-Lumber	2786	55.28	44.11	33.88	25.56	19.38	14.00
49-Treated Wood Products	267	43.07	36.33	26.22	19.85	14.23	11.24
50-Wood Posts/Poles/Piling	209	53.11	44.50	35.89	27.75	24.88	21.05
51-Millwk & Oth Lumber Pro	282	20.21	14.54	11.35	8.87	7.09	6.38
52-Plywood or Veneer	1464	54.85	44.19	33.67	24.18	15.57	10.66
53-Hardwd Stock & Floor	32	34.38	25.00	25.00	17.50	12.50	9.38
54-Wood Particle Board	499	68.34	59.92	48.10	37.68	29.26	20.44
55-Furniture	1316	29.41	21.66	14.29	8.97	5.55	3.27
56-Woodpulp & Other Pulps	733	67.94	61.53	54.98	47.70	39.15	32.74
57-Newsprint Paper	236	91.53	86.86	80.93	76.69	69.92	61.44
58-Ground Wood Paper	214	86.92	81.78	77.57	71.03	62.15	53.74
59-Printing Paper	958	61.48	53.97	44.26	36.74	29.75	23.80
60-Wrapping Paper/Pap.Bags	752	52.66	39.63	30.59	23.01	17.29	12.77
61-Pulpboard Exc. Corrugated	3137	60.89	48.65	37.74	27.67	20.08	14.28
62-Pulpboard, Corrugated	155	45.16	38.06	28.39	20.00	16.13	10.97
63-Sanitary Paper Pro	2254	20.85	15.04	10.69	7.81	5.50	4.30
64-Paperboard Box/Contain	243	23.46	19.75	13.17	10.29	8.64	7.00
65-Food Ct/FbCan/Drum/Tube	246	33.33	26.42	20.73	16.67	13.41	10.16
66-Bldg Paper/Bldg Board	536	37.69	27.99	19.40	14.18	8.77	5.41
67-Indus Inorganic Chems	775	77.68	69.94	60.52	53.68	44.90	38.84
68-Barium,Calcium Cmpds	129	86.05	75.19	68.99	60.47	53.49	41.09
69-Sodium Alkalies	519	77.65	70.91	66.47	58.38	50.10	41.62
70-Soda Ash	612	88.73	82.84	74.84	63.40	50.65	45.10
71-Industrial Gases	597	70.69	65.33	60.97	58.46	55.44	53.10
72-Indus Organic Chems	1852	71.11	64.15	56.97	50.59	44.76	38.77
73-Sulphuric Acid	347	63.11	57.93	52.74	47.55	39.77	36.02
74-Anhydrous Ammonia	497	59.76	53.72	48.49	36.42	19.32	14.29
75-Superphosphate	1268	58.52	45.43	34.31	27.21	18.77	14.35
76-Agricul Chems & Fertil	1454	67.68	58.60	49.72	39.48	31.64	24.28
77-Plastic Materials	1010	87.03	82.77	77.82	71.58	65.64	59.11
78-Rubber, Natural/Syn	388	78.61	71.13	60.82	51.55	42.27	35.57
79-Detergents/Oth Clean Prep	181	40.33	31.25	24.31	18.23	16.02	9.39
80-Salt, Rock and Common	823	43.50	30.01	24.79	19.08	14.95	13.61
81-Carbon Blacks	717	81.11	73.73	60.37	50.69	43.32	37.33
82-Petro Refining Pro	1741	62.89	56.00	49.34	44.00	37.05	31.59
83-Petro/LubOils/Greases	408	50.49	40.20	34.31	27.70	20.83	14.46
84-Asphalt Pitches/Tars	298	68.46	61.07	54.70	47.65	40.60	32.89
85-LiqGases/Coal/Petro	839	72.23	63.29	51.49	41.46	30.27	19.90
86-CnstrMt/Asphalt/Asbestos	212	67.92	58.96	50.94	39.15	28.77	25.00

Flag 7: Revenue/Variable Cost Ratio Test

Summary Statistics for Revenue/Variable Cost Ratio Tests

	TOTAL CAR LOADS	R/V 1.3 FLAG 7	R/V 1.4 FLAG 7	R/V 1.5 FLAG 7	R/V 1.6 FLAG 7	R/V 1.7 FLAG 7	R/V 1.8 FLAG 7
87-Petroleum Coke	612	50.49	38.89	28.76	22.72	16.99	12.58
88-Coke from Coal	2143	34.11	26.46	20.86	16.52	13.16	11.29
89-Tires & Tubes, Rubber	930	36.13	26.56	17.96	11.83	7.74	4.95
90-Plastic Products	413	41.65	28.09	16.46	11.86	8.47	7.99
91-Glass Containers	100	43.00	35.00	30.00	23.00	21.00	21.00
92-Hydraulic Cement	1941	49.41	41.16	32.41	24.32	16.74	11.03
93-Brik/Bloc, Clay/Shale	607	28.50	17.13	9.72	5.93	3.95	2.80
94-Clay Refractories	218	61.93	47.25	37.61	29.82	22.94	14.68
95-Lime	500	58.00	48.00	36.20	26.40	18.00	12.60
96-Gypsum Bldg Materials	205	77.07	66.83	49.76	39.02	31.71	20.98
97-Mineral Wool	618	30.10	19.74	11.97	7.61	5.34	3.72
98-Pig Iron	103	73.79	66.02	59.22	52.43	46.60	39.81
99-Semi-Finished Steel	910	53.85	40.11	33.08	24.95	19.23	15.60
100-Mnfc Iron or Steel	2607	78.37	72.11	65.55	58.07	50.17	42.27
101-Iron/Stl Pipe,Tube/Fittng	495	61.01	54.34	47.88	43.23	37.98	32.32
102-Railway Track Material	172	67.44	63.37	59.30	56.40	54.07	50.00
103-Ferroalloys	97	76.29	67.01	59.79	44.33	39.18	27.84
104-Primary Copper Pro	225	88.89	85.78	77.78	70.67	60.89	56.00
105-Primary Zinc Pro	40	87.50	80.00	75.00	67.50	47.50	40.00
106-Primary Aluminum Pro	355	84.23	79.15	74.37	70.14	64.23	56.34
107-Bras/Brz/Cpr BasicShapes	29	86.21	79.31	62.07	51.72	44.83	27.59
108-Aluminum Basic Shapes	282	75.53	68.09	59.93	53.90	46.45	26.17
109-Metal Containers	191	41.88	34.55	27.75	23.04	14.14	12.57
110-Farm Machinery	285	74.63	60.00	49.47	39.30	29.47	22.46
111-Heavy Machinery	349	77.36	71.06	65.90	61.60	55.59	51.29
112-Maj Hsehld Appliances	906	65.34	53.97	44.92	38.52	30.91	25.17
113-Household Appliances	30	70.00	70.00	60.00	56.67	46.67	43.33
114-Psngr Cars, Assembled	1907	93.65	88.15	80.76	71.95	65.92	57.79
115-Vhcles-Asm Exc PasCars	887	85.46	75.99	66.18	57.27	51.07	43.74
116-Motor Vehicle Parts	5480	77.06	67.86	59.19	51.93	44.42	37.76
117-Loco/Railway Car Pts	145	80.00	77.93	72.41	62.07	58.62	55.17
118-Iron or Steel Scrap	3207	54.54	46.30	37.51	31.37	24.57	18.58
119-Non-Ferrous Mtl Scrap	285	67.02	57.54	48.07	40.00	35.79	26.67
120-Textile Waste/Scrap	209	21.53	17.22	12.92	9.57	6.70	4.78
121-Paper Waste/Scrap	1057	25.73	17.31	13.06	8.42	5.30	4.16
122-Chem/Petro Waste	66	74.24	63.64	51.52	50.00	37.88	31.82
123-Ship Cont, R'd Empty	455	41.10	33.63	25.93	16.70	12.97	9.23
124-Freight Forwarder Traf	161	2.48	2.48	2.48	1.86	1.86	0.62
125-ShipAssoc Traffic	355	12.11	5.63	5.07	4.51	3.38	2.25
126-Misc Mixed Shipments	532	38.72	32.14	26.69	21.24	17.29	13.53
127-All Other	7666	45.41	38.42	32.26	26.26	21.42	17.77
Total SPC Carloads = 147986							
		47.71	39.95	32.83	26.79	21.67	17.59

Flag 7: Revenue/Variable Cost Ratio Test

COMBINATION TEST RESULTS
TRANSPORTATION RATE DIFFERENTIAL TEST
AND INTRAMODAL COMPETITION TEST
AND REVENUE/COST RATIO TEST

High Truck Cost

	TOTAL CAR LOADS	R/V 1.3 BOTH FLAG 12	R/V 1.4 BOTH FLAG 12	R/V 1.5 BOTH FLAG 12	R/V 1.6 BOTH FLAG 12	R/V 1.7 BOTH FLAG 12	R/V 1.8 BOTH FLAG 12
1-Cotton	386	11.14	8.81	5.70	2.85	1.55	1.04
2-Wheat	3953	4.86	4.33	3.36	2.91	2.50	2.18
3-Corn & Sorghum Grains	4086	7.47	5.58	4.24	3.11	2.03	1.49
4-Barley	542	9.41	7.56	7.01	6.46	6.09	5.35
5-Grain, All Other	550	17.64	13.82	10.91	7.64	6.00	4.18
6-Soybeans	837	15.53	11.71	8.60	7.41	6.57	5.38
7-Rice	245	14.29	13.47	12.24	11.43	10.20	9.80
8-Potatoes, Other ThaN Sweet	348	4.60	1.44	0.29	0.29	0.29	0.29
9-Sugar Beets	603	0.'3	0.33	0.33	0.33	0.33	0.33
10-Citrus Fruits	69	0.00	0.00	0.00	0.00	0.00	0.00
11-Apples	20	0.00	0.00	0.00	0.00	0.00	0.00
12-Deciduous Fruits	29	0.00	0.00	0.00	0.00	0.00	0.00
13-Fresh Vegetables	253	0.40	0.40	0.40	0.00	0.00	0.00
14-Melons	35	2.86	0.00	0.00	0.00	0.00	0.00
15-Iron Ore	2958	1.83	1.79	1.72	1.62	1.59	0.24
16-Non-Ferrous Concentrates	1033	11.91	9.49	7.45	6.10	4.36	3.19
17-Cal/Act. Bauxite Ores	694	10.23	9.51	7.20	5.76	4.90	3.89
18-Anthracite Coal	207	3.38	2.42	1.93	0.97	0.48	0.00
19-BitCoal Metallurgical	3368	2.29	2.05	1.84	1.69	0.89	0.74
20-BitCoal: Fuel,Steam	24540	2.45	1.91	0.88	0.79	0.70	0.48
21-Lignite, Prepared or Raw	338	0.89	0.30	0.00	0.00	0.00	0.00
22-Limestone & Dolomite	830	2.29	1.45	1.45	0.96	0.84	0.60
23-Construction Aggregates	5788	2.76	2.21	1.68	1.26	1.05	0.85
24-Industrial Sand	1364	10.63	8.58	6.52	3.96	3.37	2.27
25-Clays,Dry Exc. Fire Clay	1073	19.76	16.40	13.42	10.90	8.76	6.43
26-Feldspar	52	59.62	59.62	55.77	51.92	50.00	48.08
27-Potash Fertilizers	1592	12.44	10.74	9.05	7.29	5.97	4.84
28-Phosphate Rock	1527	0.33	0.33	0.33	0.33	0.33	0.26
29-Fr Meats & Packnghse Pro	86	19.77	11.63	6.98	1.16	0.00	0.00
30-Can/Pres Fruits & Veges	445	16.18	9.21	6.29	4.27	2.47	1.12
31-Oth Foodstuf Ca/Ps/Pp	2416	11.26	7.86	5.09	3.39	2.03	1.32
32-Froz Fruits Veges	548	10.95	7.66	5.47	2.92	2.19	1.46
33-Wheat Flour Milling Pro	1972	7.71	5.78	3.96	2.84	2.38	1.62
34-Dry Corn Milling Pro	177	28.81	23.73	19.77	14.69	10.73	8.47
35-Other Grain Mill Pro	2518	7.86	5.92	4.41	3.06	2.34	1.83
36-Wet Corn Milling Pro	604	25.33	21.36	16.89	14.74	11.75	9.77
37-Cereal Prep (Cooked)	653	6.13	4.13	3.06	1.99	1.53	0.31
38-Sugar: Ref/Cane/Beet	777	23.29	21.11	17.39	15.57	13.13	11.45
39-Malt Liquors	1441	10.90	7.43	5.27	3.54	2.08	1.18
40-Wines and Brandy	185	8.11	5.41	3.78	1.08	0.54	0.00
41-Alcoholic Liquors	165	30.30	22.42	18.18	15.76	12.12	9.09
42-Commercial Fats & Oils	1115	24.93	21.70	19.10	16.23	13.36	10.85
43-Seed/Nut/Vege Cake,Meal	960	26.56	21.56	16.56	12.40	8.44	5.83

Flag 12 : Transportation Rate Differential/
Intramodal Competition/
Revenue to Cost Ratio Test

COMBINATION TEST RESULTS
TRANSPORTATION RATE DIFFERENTIAL TEST
AND INTRAMODAL COMPETITION TEST
AND REVENUE/COST RATIO TEST

High Truck Cost

	TOTAL CAR LOADS	R/V 1.3 BOTH FLAG 12	R/V 1.4 BOTH FLAG 12	R/V 1.5 BOTH FLAG 12	R/V 1.6 BOTH FLAG 12	R/V 1.7 BOTH FLAG 12	R/V 1.8 BOTH FLAG 12
44-Cig/Cigaret/Manu Tobac	139	23.74	14.39	11.51	2.88	1.44	0.00
45-Textile Products	233	13.30	9.01	6.01	4.29	2.15	1.29
46-Pulpwood Logs	4826	0.99	0.66	0.37	0.29	0.25	0.19
47-Pulpwood Chips	3147	1.05	0.83	0.73	0.67	0.48	0.25
48-Lumber	2786	27.78	23.04	18.13	13.75	10.23	7.07
49-Treated Wood Products	267	17.98	13.86	10.49	7.12	4.87	2.62
50-Wood Posts/Poles/Piling	209	26.79	22.49	19.14	13.88	11.48	8.61
51-Millwk & Oth Lumber Pro	282	13.12	8.87	6.38	4.61	3.55	3.19
52-Plywood or Veneer	1464	29.10	23.91	18.51	13.66	8.27	5.60
53-Hardwd Stock & Floor	32	31.25	21.88	21.88	9.38	9.38	6.25
54-Wood Particle Board	499	45.89	40.28	32.67	26.25	20.64	15.43
55-Furniture	1316	15.05	10.79	7.37	4.48	2.58	1.44
56-Woodpulp & Other Pulps	733	15.83	14.87	12.96	10.64	8.59	7.37
57-Newsprint Paper	236	33.05	30.51	28.39	25.85	21.61	18.22
58-Ground Wood Paper	214	28.04	25.23	24.30	21.50	17.76	15.42
59-Printing Paper	958	26.41	21.71	17.22	13.57	10.02	7.83
60-Wrapping Paper/Pap.Bags	752	29.39	21.41	16.62	12.50	9.57	7.18
61-Pulpboard Exc. Corrugated	3137	20.62	16.19	12.27	8.89	6.63	4.56
62-Pulpboard, Corrugated	155	24.52	20.65	13.55	9.68	8.39	5.16
63-Sanitary Paper Pro	2254	7.85	5.28	3.82	2.66	1.69	1.29
64-Paperboard Box/Contain	243	13.58	12.76	8.64	6.58	5.35	3.70
65-Food Ct/FbCan;Drum/Tube	246	19.92	15.45	13.01	10.16	8.54	7.32
66-Bldg Paper/Bldg Board	536	19.78	13.99	9.70	6.90	4.48	3.17
67-Indus Inorganic Chems	775	34.32	31.74	27.23	23.48	19.74	17.81
68-Barium,Calcium Cmpds	129	44.19	37.21	33.33	29.46	24.81	19.38
69-Sodium Alkalies	519	32.56	30.64	28.32	24.08	20.42	16.57
70-Soda Ash	612	10.46	9.64	9.15	7.68	6.54	5.72
71-Industrial Gases	597	19.60	16.58	15.75	14.41	12.73	12.40
72-Indus Organic Chems	1852	20.79	19.17	16.47	14.52	12.53	10.96
73-Sulphuric Acid	347	25.94	23.34	21.61	19.88	17.00	14.99
74-Anhydrous Ammonia	497	12.07	9.46	7.44	5.43	3.62	3.02
75-Superphosphate	1268	20.03	14.98	11.91	9.54	6.78	5.28
76-Agricul Chems & Fertil	1454	36.80	32.39	26.62	21.80	17.88	13.14
77-Plastic Materials	1010	43.27	41.49	39.11	36.24	33.47	29.90
78-Rubber, Natural/Syn	388	28.61	25.52	20.88	17.01	14.18	10.57
79-Detergents/Oth Clean Prep	181	14.36	13.26	9.94	7.73	6.63	4.42
80-Salt, Rock and Common	823	12.52	8.99	7.41	4.74	2.31	1.58
81-Carbon Blacks	217	50.69	48.39	39.63	34.56	27.19	21.66
82-Petro Refining Pro	1741	16.14	14.07	11.77	9.36	7.12	5.69
83-Petro/LubOils/Greases	408	20.59	16.67	14.46	11.27	8.82	7.11
84-Asphalt Pitches/Tars	298	17.79	16.44	14.09	13.42	9.73	7.38
85-LiqGases/Coal/Petro	839	24.55	21.33	17.40	13.47	10.01	5.72
86-CnstrMt/Asphalt/Asbestos	212	39.62	34.43	28.77	22.64	15.57	13.21

Flag 12 : Transportation Rate Differential/
Intramodal Competition/
Revenue to Cost Ratio Test

AND INTRAMODAL COMPETITION TEST
AND REVENUE/COST RATIO TEST

High Truck Cost

	TOTAL CAR LOADS	R/V 1.3 BOTH FLAG 12	R/V 1.4 BOTH FLAG 12	R/V 1.5 BOTH FLAG 12	R/V 1.6 BOTH FLAG 12	R/V 1.7 BOTH FLAG 12	R/V 1.8 BOTH FLAG 12
87-Petroleum Coke	612	6.21	5.88	5.23	4.58	3.76	2.78
88-Coke from Coal	2143	1.45	0.89	0.51	0.33	0.23	0.19
89-Tires & Tubes, Rubber	930	12.90	9.03	6.24	4.09	3.01	1.94
90-Plastic Products	413	16.46	12.35	7.99	5.08	3.39	3.39
91-Glass Containers	100	25.00	20.00	17.00	11.00	10.00	10.00
92-Hydraulic Cement	1941	11.23	9.58	7.83	6.34	4.48	3.35
93-Brik/Bloc, Clay/Shale	607	19.11	11.04	5.44	2.97	1.48	0.99
94-Clay Refractories	218	33.94	25.23	20.18	15.14	12.39	8.26
95-Lime	500	12.40	9.40	7.00	5.80	4.60	3.80
96-Gypsum Bldg Materials	205	25.85	21.46	17.07	12.68	9.76	4.88
97-Mineral Wool	618	12.78	8.90	5.99	4.05	2.75	1.46
98-Pig Iron	103	25.24	24.27	19.42	18.45	14.56	14.56
99-Semi-Finished Steel	910	2.20	1.87	1.54	1.21	0.77	0.44
100-Mnfc Iron or Steel	2607	11.12	9.78	8.36	6.87	5.33	4.07
101-Iron/Stl Pipe,Tube/Fittng	495	14.95	12.73	10.91	9.49	8.08	6.26
102-Railway Track Material	172	25.58	23.26	20.93	19.77	18.02	15.70
103-Ferroalloys	97	36.08	32.99	27.84	19.59	18.56	12.37
104-Primary Copper Pro	225	24.89	22.67	18.67	14.22	11.11	10.22
105-Primary Zinc Pro	40	72.50	65.00	60.00	55.00	37.50	32.50
106-Primary Aluminum Pro	355	30.42	29.01	26.48	25.07	22.82	19.72
107-Bras/Brz/Cpr BasicShapes	29	27.59	20.69	17.24	13.79	13.79	6.90
108-Aluminum Basic Shapes	282	14.89	14.18	12.06	10.28	8.87	6.38
109-Metal Containers	191	25.13	21.99	17.80	15.18	8.38	6.81
110-Farm Machinery	285	6.32	4.91	3.16	2.11	1.75	1.05
111-Heavy Machinery	349	11.17	9.17	7.74	6.30	4.87	4.58
112-Maj Hsehld Appliances	906	15.34	10.49	6.95	4.64	2.87	2.10
113-Household Appliances	30	10.00	10.00	6.67	6.67	3.33	3.33
114-Psngr Cars, Assembled	1907	15.10	13.95	13.06	12.38	11.17	9.60
115-Vhcles-Asm Exc PasCars	887	0.11	0.11	0.11	0.11	0.11	0.11
116-Motor Vehicle Parts	5480	1.92	1.35	1.00	0.77	0.62	0.53
117-Loco/Railway Car Pts	145	22.76	21.38	19.31	14.48	13.79	11.72
118-Iron or Steel Scrap	3207	5.27	4.65	3.87	3.27	2.43	1.96
119-Non-Ferrous Mtl Scrap	285	25.96	22.46	18.60	15.44	14.74	11.58
120-Textile Waste/Scrap	209	13.40	10.05	7.66	5.74	3.83	2.87
121-Paper Waste/Scrap	1057	12.68	7.66	5.68	3.50	2.46	1.80
122-Chem/Petro Waste	66	34.85	33.33	27.27	25.76	16.67	16.67
123-Ship Cont, R'd Empty	455	14.95	12.09	8.57	5.05	3.74	1.76
124-Freight Forwarder Traf	161	1.24	1.24	1.24	0.62	0.62	0.62
125-ShipAssoc Traffic	355	3.94	0.85	0.85	0.85	0.00	0.00
126-Misc Mixed Shipments	532	13.35	11.09	8.46	6.39	5.26	3.95
127-All Other	7666	19.88	16.54	13.51	10.49	8.11	6.59
0Total SPC Carloads = 147986							
		10.89	8.95	7.13	5.68	4.46	3.47

Flag 12 : Transportation Rate Differential/
Intramodal Competition/
Revenue to Cost Ratio Test

COMBINATION TEST RESULTS
COST DIFFERENTIAL TEST, INTRAMODAL TEST
REVENUE/COST RATIO TEST

Low Truck Cost

	T/TAL CAR LOADS	R/V 1.3 BOTH FLAG 12	R/V 1.4 BOTH FLAG 12	R/V 1.5 BOTH FLAG 12	R/V 1.6 BOTH FLAG 12	R/V 1.7 BOTH FLAG 12	R/V 1.8 BOTH FLAG 12
1-Cotton	386	4.66	3.37	2.07	0.52	0.26	0.00
2-Wheat	3951	2.63	2.13	1.54	1.04	0.91	0.66
3-Corn & Sorghum Grains	4084	5.46	3.89	2.38	1.57	1.08	0.71
4-Barley	542	5.54	4.43	4.24	3.69	3.14	3.14
5-Grains All Other	551	10.16	7.99	6.35	4.17	2.54	1.27
6-Soybeans	837	8.36	5.85	4.06	3.11	2.63	1.55
7-Rice	245	12.65	12.24	11.02	10.61	9.80	9.39
8-Potatoes, Other Than Sweet	348	0.86	0.29	0.29	0.29	0.29	0.29
9-Sugar Beets	603	0.33	0.33	0.33	0.33	0.33	0.33
10-Citrus Fruits	69	0.00	0.00	0.00	0.00	0.00	0.00
11-Apples	20	0.00	0.00	0.00	0.00	0.00	0.00
12-Deciduous Fruits	29	0.00	0.00	0.00	0.00	0.00	0.00
13-Fresh Vegetables	253	0.79	0.40	0.40	0.00	0.00	0.00
14-Melons	35	0.00	0.00	0.00	0.00	0.00	0.00
15-Iron Ore	2958	1.76	1.69	1.59	1.56	0.20	0.14
16-Non-Ferrous Concentrates	1033	9.29	7.07	6.20	4.84	3.78	2.61
17-Cal/Act. Bauxite Ores	694	8.36	7.78	6.20	4.76	3.60	3.03
18-Anthracite Coal	207	2.90	2.42	1.45	0.48	0.48	0.00
19-BitCoal Metallurgical	3368	2.20	1.99	1.81	1.63	0.33	0.24
20-BitCoal: Fuel,Steam	24540	2.37	1.98	0.77	0.51	0.46	0.42
21-Lignite, Prepared or Raw	338	0.59	0.00	0.00	0.00	0.00	0.00
22-Limestone & Dolomite	830	1.57	1.20	0.72	0.60	0.48	0.36
23-Construction Aggregates	5788	2.23	1.71	1.24	0.85	0.40	0.31
24-Industrial Sand	1364	6.96	5.13	3.52	2.27	1.69	1.10
25-Clays,Dry Exc. Fire Clay	1073	13.42	10.90	8.57	7.08	5.59	4.75
26-Feldspar	52	36.54	36.54	36.54	32.69	32.69	30.77
27-Potash Fertilizers	1592	9.48	7.54	6.28	4.40	3.45	2.70
28-Phosphate Rock	1527	0.26	0.26	0.26	0.26	0.26	0.13
29-Fr Meats & Packnghse Pro	86	4.65	4.65	2.33	1.16	0.00	0.00
30-Can/Pres Fruits & Veges	445	8.99	4.72	2.25	1.57	0.90	0.45
31-Oth Foodstuf Ca/Ps/Pp	2416	6.42	3.89	2.61	1.57	0.70	0.41
32-Froz Fruits Veges	548	6.39	4.01	1.82	0.55	0.00	0.00
33-Wheat Flour Milling Pro	1966	3.31	2.34	1.32	0.81	0.61	0.36
34-Dry Corn Milling Pro	177	15.82	12.43	9.60	7.34	4.52	2.26
35-Other Grain Mill Pro	2515	4.61	3.54	2.47	1.63	1.35	1.03
36-Wet Corn Milling Pro	604	17.55	14.24	11.59	9.44	8.28	7.12
37-Cereal Prep (Cooked)	653	3.06	2.14	1.38	1.07	1.07	0.15
38-Sugar: Ref/Cane/Beet	777	17.25	15.44	13.00	10.94	9.01	7.72
39-Malt Liquors	1441	6.80	4.51	3.05	2.01	0.83	0.49
40-Wines and Brandy	185	5.95	3.78	1.08	0.54	0.00	0.00
41-Alcoholic Liquors	165	16.36	12.73	9.70	8.48	6.67	5.45
42-Commercial Fats & Oils	1115	18.03	15.78	13.63	11.57	8.70	6.46
43-Seed/Nut/Vege Cake,Meal	960	18.75	14.58	11.15	8.54	5.73	3.75

Flag 12 : Transportation Rate Differential/
Intramodal Competition/
Revenue to Cost Ratio Test

COMBINATION TEST RESULTS
COST DIFFERENTIAL TEST, INTRAMODAL TEST
REVENUE/COST RATIO TEST

Low Truck Cost

	TOTAL CAR LOADS	R/V 1.3 BOTH FLAG 12	R/V 1.4 BOTH FLAG 12	R/V 1.5 BOTH FLAG 12	R/V 1.6 BOTH FLAG 12	R/V 1.7 BOTH FLAG 12	R/V 1.8 BOTH FLAG 12
44-Cig/Cigaret/Manu Tobac	139	4.32	2.16	0.72	0.72	0.00	0.00
45-Textile Products	233	9.44	6.44	4.29	2.15	0.86	0.43
46-Pulpwood Logs	4820	0.58	0.39	0.21	0.15	0.15	0.10
47-Pulpwood Chips	3147	0.89	0.64	0.51	0.35	0.29	0.13
48-Lumber	2786	22.58	18.16	13.93	10.01	6.46	4.52
49-Treated Wood Products	267	10.11	6.74	4.87	2.62	1.87	1.12
50-Wood Posts/Poles/Piling	209	15.31	11.96	10.05	6.22	5.26	3.83
51-Millwk & Oth Lumber Pro	282	8.51	4.96	3.55	1.77	1.06	0.35
52-Plywood or Veneer	1464	21.58	17.83	13.11	9.22	4.99	3.35
53-Hardwd Stock & Floor	32	31.25	21.88	21.88	15.63	9.38	6.25
54-Wood Particle Board	499	39.28	34.87	27.86	23.25	18.64	14.23
55-Furniture	1311	9.46	6.33	4.04	2.14	1.14	0.61
56-Woodpulp & Other Pulps	733	10.50	9.82	8.46	6.55	5.46	4.23
57-Newsprint Paper	236	16.53	16.10	13.56	11.86	9.75	5.93
58-Ground Wood Paper	214	14.95	14.02	13.55	12.62	10.28	8.88
59-Printing Paper	958	16.39	13.78	11.27	8.77	6.58	5.43
60-Wrapping Paper/Pap.Bags	752	20.08	15.16	11.57	8.78	6.78	4.92
61-Pulpboard Exc. Corrugated	3137	16.45	13.29	10.14	7.33	5.13	3.38
62-Pulpboard, Corrugated	155	18.71	14.84	11.61	7.10	3.87	2.58
63-Sanitary Paper Pro	2252	5.24	3.33	2.00	1.38	0.58	0.44
64-Paperboard Box/Contain	243	4.53	3.29	2.06	0.41	0.41	0.00
65-Food Ct/FbCan,Drum/Tube	246	8.13	4.88	4.47	3.66	2.85	2.44
66-Bldg Paper/Bldg Board	536	13.43	8.58	5.41	4.10	2.43	1.87
67-Indus Inorganic Chems	775	21.03	18.45	15.61	12.52	10.71	9.68
68-Barium,Calcium Cmpds	129	20.16	16.28	15.50	12.40	10.08	6.98
69-Sodium Alkalies	519	25.05	23.89	21.58	19.08	15.41	12.52
70-Soda Ash	612	6.37	5.88	5.39	4.74	3.92	3.43
71-Industrial Gases	597	11.89	10.39	9.38	8.21	6.70	5.70
72-Indus Organic Chems	1852	14.79	13.17	11.07	9.02	7.83	6.53
73-Sulphuric Acid	347	19.31	17.29	15.85	14.41	12.68	9.22
74-Anhydrous Ammonia	497	10.26	8.05	5.63	3.82	2.01	1.41
75-Superphosphate	1267	17.21	13.63	9.16	6.95	5.13	4.03
76-Agricul Chems & Fertil	1454	25.24	21.53	17.47	13.89	10.39	7.77
77-Plastic Materials	1010	30.50	28.61	27.23	24.95	22.49	20.50
78-Rubber, Natural/Syn	388	21.91	19.07	14.43	11.60	9.02	6.19
79-Detergents/Oth Clean Prep	181	6.08	4.97	3.31	1.10	1.10	1.10
80-Salt, Rock and Common	823	9.36	6.93	5.59	3.65	1.22	0.36
81-Carbon Blacks	217	23.04	21.66	16.13	12.90	10.60	7.83
82-Petro Refining Pro	1741	12.46	11.09	8.62	6.78	4.82	3.62
83-Petro/LubOils/Greases	408	13.97	10.78	8.82	7.11	4.90	3.43
84-Asphalt Pitches/Tars	298	11.41	9.73	9.40	7.72	6.71	5.03
85-LiqGases/Coal/Petro	839	21.69	18.83	14.30	10.73	7.15	3.69
86-CnstrMt/Asphalt/Asbestos	212	16.98	15.57	9.91	5.66	3.77	3.77

Flag 12 : Transportation Rate Differential/
Intramodal Competition/
Revenue to Cost Ratio Test

COMBINATION TEST RESULTS
COST DIFFERENTIAL TEST, INTRAMODAL TEST
REVENUE/COST RATIO TEST

Low Truck Cost

	TOTAL CAR LOADS	R/V 1.3 BOTH FLAG 12	R/V 1.4 BOTH FLAG 12	R/V 1.5 BOTH FLAG 12	R/V 1.6 BOTH FLAG 12	R/V 1.7 BOTH FLAG 12	R/V 1.8 BOTH FLAG 12
87-Petroleum Coke	612	4.90	4.25	3.76	3.27	2.29	2.12
88-Coke from Coal	2143	0.84	0.56	0.23	0.19	0.14	0.14
89-Tires & Tubes, Rubber	930	7.10	4.19	2.47	1.29	0.86	0.43
90-Plastic Products	413	9.69	7.02	3.63	1.45	1.21	1.21
91-Glass Containers	100	19.00	16.00	14.00	10.00	9.00	9.00
92-Hydraulic Cement	1941	6.29	4.79	3.19	2.27	1.34	0.88
93-Brik/Bloc, Clay/Shale	607	13.67	6.43	3.62	1.48	0.49	0.33
94-Clay Refractories	218	22.02	17.43	12.84	11.01	7.80	5.05
95-Lime	500	7.40	5.20	3.20	2.40	1.80	1.40
96-Gypsum Bldg Materials	205	14.63	10.24	7.80	5.37	4.88	2.93
97-Mineral Wool	618	6.96	3.88	1.94	1.29	0.81	0.32
98-Pig Iron	103	16.50	16.50	13.59	10.68	10.68	7.77
99-Semi-Finished Steel	910	1.21	1.10	0.66	0.55	0.11	0.11
100-Mnfc Iron or Steel	2607	5.26	4.49	3.61	2.80	1.84	1.23
101-Iron/Stl Pipe,Tube/Fittng	495	6.67	4.85	4.44	3.43	3.23	2.42
102-Railway Track Material	172	11.05	9.30	7.56	6.98	5.23	4.65
103-Ferroalloys	97	21.65	17.53	17.53	12.37	7.22	6.19
104-Primary Copper Pro	225	16.89	15.11	12.00	8.89	8.00	7.11
105-Primary Zinc Pro	40	55.00	50.00	45.00	40.00	27.50	22.50
106-Primary Aluminum Pro	355	26.20	25.07	22.25	20.85	19.15	15.77
107-Bras/Brz/Cpr BasicShapes	29	20.69	17.24	13.79	10.34	10.34	6.90
108-Aluminum Basic Shapes	282	8.16	7.09	6.38	5.32	4.61	3.19
109-Metal Containers	191	12.57	10.47	8.90	5.76	3.14	2.62
110-Farm Machinery	285	2.46	2.46	1.75	1.40	1.05	0.70
111-Heavy Machinery	349	4.87	3.15	2.87	2.01	1.43	1.15
112-Maj Hsehld Appliances	906	6.62	4.53	3.20	1.99	1.32	0.66
113-Household Appliances	30	6.67	3.33	3.33	3.33	3.33	3.33
114-Psngr Cars, Assembled	1907	14.63	13.74	12.90	12.11	10.91	9.49
115-Vhcles-Asm Exc PasCars	887	0.11	0.11	0.11	0.11	0.11	0.11
116-Motor Vehicle Parts	5480	0.91	0.66	0.46	0.29	0.24	0.16
117-Loco/Railway Car Pts	145	10.34	9.66	8.97	4.83	4.14	3.45
118-Iron or Steel Scrap	3207	1.31	1.09	0.65	0.50	0.31	0.22
119-Non-Ferrous Mtl Scrap	285	6.32	5.26	3.51	2.46	2.11	1.75
120-Textile Waste/Scrap	209	6.22	3.83	3.35	2.39	0.96	0.96
121-Paper Waste/Scrap	1057	7.19	3.41	2.37	1.42	0.95	0.76
122-Chem/Petro Waste	66	18.18	16.67	15.15	10.61	9.09	4.55
123-Ship Cont, R'd Empty	455	6.37	5.49	4.18	2.42	1.54	0.66
124-Freight Forwarder Traf	161	1.24	1.24	0.62	0.62	0.62	0.62
125-ShipAssoc Traffic	355	2.82	0.00	0.00	0.00	0.00	0.00
126-Misc Mixed Shipments	532	6.39	4.51	3.20	1.50	0.94	0.94
127-All Other	7664	11.94	9.34	7.14	5.36	4.01	2.91
0Total SPC Carloads = 147960							
		7.35	5.92	4.50	3.45	2.56	1.96

Flag 12 : Transportation Rate Differential/
Intramodal Competition/
Revenue to Cost Ratio Test

COMBINATION TEST RESULTS
RATE/SERVICE DIFFERENTIAL TEST, INTRAMODEL COMPETITION TEST AND REVENUE/COST RATIO TEST

High Truck Cost

	TOTAL CAR LOADS	R/V 1.3 BOTH FLAG 13	R/V 1.4 BOTH FLAG 13	R/V 1.5 BOTH FLAG 13	R/V 1.6 BOTH FLAG 13	R/V 1.7 BOTH FLAG 13	R/V 1.8 BOTH FLAG 13
1-Cotton	386	1.04	0.52	0.52	0.00	0.00	0.00
2-Wheat	3953	4.63	4.12	3.26	2.81	2.43	2.12
3-Corn & Sorghum Grains	4084	7.30	5.44	4.11	2.99	1.93	1.44
4-Barley	542	9.23	7.38	6.83	6.27	5.90	5.17
5-Grain, All Other	550	17.27	13.45	10.73	7.45	5.82	4.18
6-Soybeans	837	14.70	11.23	8.12	6.93	6.09	5.02
7-Rice	245	14.29	13.47	12.24	11.43	10.20	9.80
8-Potatoes, Other Than Sweet	348	3.45	1.15	0.29	0.29	0.29	0.29
9-Sugar Beets	603	0.33	0.33	0.33	0.33	0.33	0.33
10-Citrus Fruits	69	0.00	0.00	0.00	0.00	0.00	0.00
11-Apples	20	0.00	0.00	0.00	0.00	0.00	0.00
12-Deciduous Fruits	29	0.00	0.00	0.00	0.00	0.00	0.00
13-Fresh Vegetables	253	0.40	0.40	0.40	0.00	0.00	0.00
14-Melons	35	0.00	0.00	0.00	0.00	0.00	0.00
15-Iron Ore	2958	1.83	1.79	1.72	1.62	1.59	0.24
16-Non-Ferrous Concentrates	1033	8.23	6.68	5.42	4.45	3.29	2.42
17-Cal/Act. Bauxite Ores	694	10.23	9.51	7.20	5.76	4.90	3.89
18-Anthracite Coal	207	3.38	2.42	1.93	0.97	0.48	0.00
19-BitCoal Metallurgical	3368	2.29	2.05	1.84	1.69	0.89	0.74
20-BitCoal: Fuel;Steam	24540	2.45	1.91	0.88	0.79	0.70	0.48
21-Lignite, Prepared or Raw	339	0.89	0.30	0.00	0.00	0.00	0.00
22-Limestone & Dolomite	830	2.29	1.45	1.45	0.96	0.84	0.60
23-Construction Aggregates	5788	2.76	2.21	1.68	1.26	1.05	0.85
24-Industrial Sand	1364	10.56	8.50	6.45	3.96	3.37	2.27
25-Clays,Dry Exc. Fire Clay	1073	19.66	16.31	13.33	10.81	8.67	6.34
26-Feldspar	52	59.62	59.62	55.77	51.92	50.00	48.08
27-Potash Fertilizers	1592	12.44	10.74	9.05	7.29	5.97	4.84
28-Phosphate Rock	1527	0.33	0.33	0.33	0.33	0.33	0.26
29-Fr Meats & Packnghse Pro	86	0.00	0.00	0.00	0.00	0.00	0.00
30-Can/Pres Fruits & Veges	445	0.90	0.45	0.22	0.22	0.22	0.22
31-Oth Foodstuf Ca/Ps/Pp	2416	2.57	1.37	0.70	0.41	0.17	0.08
32-Froz Fruits Veges	548	2.19	1.09	0.18	0.00	0.00	0.00
33-Wheat Flour Milling Pro	1972	5.07	3.75	2.48	1.52	1.37	0.81
34-Dry Corn Milling Pro	177	19.21	16.38	12.99	9.04	6.21	5.08
35-Other Grain Mill Pro	2518	4.85	3.73	2.74	1.99	1.55	1.15
36-Wet Corn Milling Pro	604	17.55	14.74	11.59	10.26	8.28	6.95
37-Cereal Prep (Cooked)	653	0.15	0.00	0.00	0.00	0.00	0.00
38-Sugar: Ref/Cane/Beet	777	12.10	10.81	9.52	8.24	7.34	6.56
39-Malt Liquors	1441	3.19	2.29	1.60	0.76	0.42	0.35
40-Wines and Brandy	185	4.86	2.16	1.08	0.54	0.00	0.00
41-Alcoholic Liquors	165	2.42	1.82	1.82	1.82	1.82	1.21
42-Commercial Fats & Oils	1115	8.61	7.17	6.19	4.75	3.14	2.51
43-Seed/Nut/Vege Cake,Meal	960	17.08	14.27	10.83	8.33	5.94	4.38

Flag 13 : Rate/Service Differential/

COMBINATION TEST RESULTS
RATE/SERVICE DIFFERENTIAL TEST, INTRAMODEL COMPETITION TEST AND REVENUE/COST RATIO TEST

High Truck Cost

	TOTAL CAR LOADS	R/V 1.3 BOTH FLAG 13	R/V 1.4 BOTH FLAG 13	R/V 1.5 BOTH FLAG 13	R/V 1.6 BOTH FLAG 13	R/V 1.7 BOTH FLAG 13	R/V 1.8 BOTH FLAG 13
44-Cig/Cigaret/Manu Tobac	139	0.00	0.00	0.00	0.00	0.00	0.00
45-Textile Products	233	0.43	0.43	0.43	0.43	0.43	0.43
46-Pulpwood Logs	4826	0.99	0.66	0.37	0.29	0.25	0.19
47-Pulpwood Chips	3147	1.05	0.83	0.73	0.67	0.48	0.25
48-Lumber	2786	18.74	14.72	10.73	7.65	5.10	3.34
49-Treated Wood Products	267	11.61	7.87	5.99	3.75	3.37	1.87
50-Wood Posts/Poles/Piling	209	19.14	16.75	13.40	8.13	7.18	4.78
51-Millwk & Oth Lumber Pro	282	6.38	3.55	2.13	1.42	0.35	0.35
52-Plywood or Veneer	1464	15.37	12.23	9.22	6.63	3.48	2.25
53-Hardwd Stock & Floor	32	18.75	15.63	15.63	6.25	6.25	3.13
54-Wood Particle Board	499	33.47	30.26	25.05	20.44	16.43	12.22
55-Furniture	1316	3.50	2.20	1.37	0.53	0.15	0.08
56-Woodpulp & Other Pulps	733	4.64	3.96	3.00	2.18	1.77	1.09
57-Newsprint Paper	236	0.85	0.85	0.42	0.42	0.42	0.00
58-Ground Wood Paper	214	2.80	2.80	2.34	2.34	1.40	1.40
59-Printing Paper	958	3.24	3.03	2.40	1.88	1.25	0.94
60-Wrapping Paper/Pap.Bags	752	3.59	2.66	2.13	1.60	1.60	1.33
61-Pulpboard Exc. Corrugated	3137	5.42	4.27	3.47	2.55	1.91	1.50
62-Pulpboard, Corrugated	155	5.81	5.81	4.52	3.23	1.94	1.94
63-Sanitary Paper Pro	2254	2.93	1.42	0.93	0.35	0.13	0.09
64-Paperboard Box/Contain	243	1.23	1.23	0.00	0.00	0.00	0.00
65-Food Ct/FbCan,Drum/Tube	246	4.88	3.25	2.85	2.03	1.63	1.63
66-Bldg Paper/Bldg Board	536	10.26	7.09	4.48	2.99	1.87	1.31
67-Indus Inorganic Chems	775	8.00	6.71	5.55	4.90	4.26	3.61
68-Barium,Calcium Cmpds	129	15.50	12.40	10.08	9.30	7.75	5.43
69-Sodium Alkalies	519	15.80	14.45	13.49	11.75	9.06	6.94
70-Soda Ash	612	9.64	8.82	8.33	7.35	6.21	5.39
71-Industrial Gases	597	10.55	8.88	8.54	7.71	6.20	6.03
72-Indus Organic Chems	1852	8.86	7.83	6.32	5.29	4.10	3.40
73-Sulphuric Acid	347	19.88	19.02	17.58	16.14	13.83	11.82
74-Anhydrous Ammonia	497	10.26	7.85	6.24	4.83	3.22	2.62
75-Superphosphate	1268	19.79	14.75	11.67	9.38	6.62	5.28
76-Agricul Chems & Fertil	1454	35.01	31.09	25.52	21.18	17.47	12.79
77-Plastic Materials	1010	15.74	14.85	14.16	12.67	11.58	9.90
78-Rubber, Natural/Syn	388	1.29	0.77	0.52	0.52	0.52	0.52
79-Detergents/Oth Clean Prep	181	1.10	1.10	0.55	0.00	0.00	0.00
80-Salt, Rock and Common	823	12.52	8.99	7.41	4.74	2.31	1.58
81-Carbon Blacks	217	47.47	45.16	36.41	31.34	24.88	19.82
82-Petro Refining Pro	1741	2.76	1.78	1.55	1.03	0.40	0.29
83-Petro/LubOils/Greases	408	2.21	1.96	1.47	1.23	0.98	0.49
84-Asphalt Pitches/Tars	298	5.03	4.70	4.36	4.03	3.36	2.35
85-LiqGases/Coal/Petro	839	7.51	5.84	3.93	2.98	2.26	1.31
86-CnstrMt/Asphalt/Asbestos	212	4.72	4.25	3.77	2.36	0.94	0.94

Flag 13 : Rate/Service Differential/

COMBINATION TEST RESULTS
RATE/SERVICE DIFFERENTIAL TEST, INTRAMODEL COMPETITION TEST AND REVENUE/COST RATIO TEST

High Truck Cost

	TOTAL CAR LOADS	R/V 1.3 BOTH FLAG 13	R/V 1.4 BOTH FLAG 13	R/V 1.5 BOTH FLAG 13	R/V 1.6 BOTH FLAG 13	R/V 1.7 BOTH FLAG 13	R/V 1.8 BOTH FLAG 13
87-Petroleum Coke	612	6.05	5.72	5.07	4.41	3.59	2.61
88-Coke from Coal	2143	1.45	0.89	0.51	0.33	0.23	0.19
89-Tires & Tubes, Rubber	930	1.18	0.32	0.11	0.00	0.00	0.00
90-Plastic Products	413	3.63	2.66	1.69	0.73	0.48	0.48
91-Glass Containers	100	17.00	14.00	12.00	9.00	8.00	8.00
92-Hydraulic Cement	1941	11.23	9.58	7.83	6.34	4.48	3.35
93-Brik/Bloc, Clay/Shale	607	19.11	11.04	5.44	2.97	1.48	0.99
94-Clay Refractories	218	28.44	21.10	17.43	13.30	10.55	6.88
95-Lime	500	12.00	9.00	6.60	5.40	4.20	3.40
96-Gypsum Bldg Materials	205	11.22	8.78	6.34	3.90	3.90	0.98
97-Mineral Wool	618	6.31	4.85	2.59	1.62	1.29	0.49
98-Pig Iron	103	18.45	18.45	13.59	13.59	10.68	10.68
99-Semi-Finished Steel	910	0.44	0.22	0.22	0.11	0.11	0.11
100-Mnfc Iron or Steel	2607	0.77	0.61	0.42	0.27	0.23	0.15
101-Iron/Stl Pipe,Tube/Fittng	495	0.00	0.00	0.00	0.00	0.00	0.00
102-Railway Track Material	172	13.95	12.21	11.05	10.47	8.72	6.98
103-Ferroalloys	97	12.37	11.34	9.28	4.12	4.12	3.09
104-Primary Copper Pro	225	0.00	0.00	0.00	0.00	0.00	0.00
105-Primary Zinc Pro	40	7.50	5.00	2.50	2.50	2.50	2.50
106-Primary Aluminum Pro	355	0.28	0.28	0.28	0.28	0.28	0.00
107-Bras/Brz/Cpr BasicShapes	29	3.45	3.45	3.45	3.45	3.45	0.00
108-Aluminum Basic Shapes	282	0.71	0.71	0.00	0.00	0.00	0.00
109-Metal Containers	191	2.09	2.09	1.57	1.57	0.00	0.00
110-Farm Machinery	285	0.00	0.00	0.00	0.00	0.00	0.00
111-Heavy Machinery	349	2.01	1.43	1.43	0.86	0.57	0.29
112-Maj Hsehld Appliances	906	1.99	1.21	0.88	0.22	0.11	0.11
113-Household Appliances	30	0.00	0.00	0.00	0.00	0.00	0.00
114-Psngr Cars, Assembled	1907	1.47	1.47	1.47	1.47	1.42	1.31
115-Vhcles-Asm Exc PasCars	887	0.00	0.00	0.00	0.00	0.00	0.00
116-Motor Vehicle Parts	5480	0.04	0.04	0.02	0.02	0.00	0.00
117-Loco/Railway Car Pts	145	0.69	0.69	0.69	0.00	0.00	0.00
118-Iron or Steel Scrap	3207	1.59	1.47	1.09	0.90	0.56	0.37
119-Non-Ferrous Mtl Scrap	285	8.07	6.67	5.26	4.21	4.21	3.86
120-Textile Waste/Scrap	209	10.05	7.18	5.74	4.31	2.39	1.91
121-Paper Waste/Scrap	1057	9.65	5.77	4.16	2.55	1.61	1.23
122-Chem/Petro Waste	66	9.09	7.58	6.06	6.06	3.03	3.03
123-Ship Cont, R'd Empty	455	12.97	10.55	7.69	4.18	3.08	1.32
124-Freight Forwarder Trf	161	1.24	1.24	1.24	0.62	0.62	0.62
125-ShipAssoc Traffic	355	1.69	0.00	0.00	0.00	0.00	0.00
126-Misc Mixed Shipments	532	4.51	3.20	1.69	0.75	0.38	0.38
127-All Other	7666	9.56	7.71	6.29	4.64	3.50	2.73
0Total SPC Carloads = 147986							
Flag 13 : Rate/Service Differential/ Revenue to Cost Ratio Test		5.76	4.64	3.57	2.79	2.16	1.64

COMBINATION TEST RESULTS
RATE/SERVICE DIFFERENTIAL TEST, INTRAMODEL COMPETITION TEST AND REVENUE/COST RATIO TEST

Low Truck Cost

	TOTAL CAR LOADS	R/V 1.3 BOTH FLAG 13	R/V 1.4 BOTH FLAG 13	R/V 1.5 BOTH FLAG 13	R/V 1.6 BOTH FLAG 13	R/V 1.7 BOTH FLAG 13	R/V 1.8 BOTH FLAG 13
1-Cotton	386	0.00	0.00	0.00	0.00	0.00	0.00
2-Wheat	3951	2.33	1.82	1.29	0.86	0.76	0.53
3-Corn & Sorghum Grains	4084	5.24	3.72	2.25	1.44	0.98	0.64
4-Barley	542	5.17	4.24	4.06	3.69	3.14	3.14
5-Grain, All Other	551	9.80	7.80	6.17	3.99	2.54	1.27
6-Soybeans	837	6.45	4.06	2.51	1.79	1.43	0.72
7-Rice	245	11.02	10.61	9.80	9.39	8.57	8.16
8-Potatoes, Other Than Sweet	348	0.29	0.00	0.00	0.00	0.00	0.00
9-Sugar Beets	603	0.33	0.33	0.33	0.33	0.33	0.33
10-Citrus Fruits	69	0.00	0.00	0.00	0.00	0.00	0.00
11-Apples	20	0.00	0.00	0.00	0.00	0.00	0.00
12-Deciduous Fruits	29	0.00	0.00	0.00	0.00	0.00	0.00
13-Fresh Vegetables	253	0.40	0.40	0.40	0.00	0.00	0.00
14-Melons	35	0.00	0.00	0.00	0.00	0.00	0.00
15-Iron Ore	2958	1.76	1.69	1.59	1.56	0.20	0.14
16-Non-Ferrous Concentrates	1033	2.61	2.13	2.03	1.26	0.97	0.68
17-Cal/Act. Bauxite Ores	694	7.93	7.35	5.76	4.32	3.31	2.74
18-Anthracite Coal	207	2.90	2.42	1.45	0.48	0.48	0.00
19-BitCoal Metallurgical	7368	2.17	1.96	1.78	1.60	0.33	0.24
20-BitCoal: Fuel,Steam	24540	2.36	1.98	0.76	0.51	0.46	0.42
21-Lignite, Prepared or Raw	338	0.59	0.00	0.00	0.00	0.00	0.00
22-Limestone & Dolomite	830	1.57	1.20	0.72	0.60	0.48	0.36
23-Construction Aggregates	5788	2.21	1.71	1.24	0.85	0.40	0.31
24-Industrial Sand	1364	6.67	4.84	3.37	2.20	1.69	1.10
25-Clays,Dry Exc. Fire Clay	1073	12.86	10.44	8.20	6.80	5.31	4.47
26-Feldspar	52	34.62	34.62	34.62	32.69	32.69	30.77
27-Potash Fertilizers	1592	8.92	7.10	5.84	4.02	3.14	2.45
28-Phosphate Rock	1527	0.26	0.26	0.26	0.26	0.26	0.13
29-Fr Meats & Packnghse Pro	86	0.00	0.00	0.00	0.00	0.00	0.00
30-Can/Pres Fruits & Veges	445	0.22	0.22	0.22	0.22	0.22	0.22
31-Oth Foodstuf Ca/Ps/Pr	2416	0.17	0.12	0.08	0.04	0.04	0.04
32-Froz Fruits Veges	548	0.00	0.00	0.00	0.00	0.00	0.00
33-Wheat Flour Milling Pro	1966	0.86	0.56	0.25	0.20	0.15	0.05
34-Dry Corn Milling Pro	177	5.08	4.52	4.52	3.39	2.26	1.13
35-Other Grain Mill Pro	2515	0.72	0.48	0.28	0.12	0.12	0.08
36-Wet Corn Milling Pro	604	9.27	7.62	6.13	4.30	3.64	2.98
37-Cereal Prep (Cooked)	653	0.00	0.00	0.00	0.00	0.00	0.00
38-Sugar: Ref/Cane/Beet	777	4.89	4.25	3.47	2.57	1.67	1.16
39-Malt Liquors	1441	0.49	0.21	0.07	0.07	0.07	0.07
40-Wines and Brandy	185	2.70	1.08	1.08	0.54	0.00	0.00
41-Alcoholic Liquors	165	1.82	1.21	1.21	1.21	1.21	0.61
42-Commercial Fats & Oils	1115	2.87	1.70	1.26	0.81	0.36	0.09
43-Seed/Nut/Vege Cake,Meal	960	3.75	3.33	2.81	2.19	1.67	1.25

Flag 13 : Rate/Service Differential/
Revenue to Cost Ratio Test

COMBINATION TEST RESULTS
RATE/SERVICE DIFFERENTIAL TEST, INTRAMODEL COMPETITION TEST AND REVENUE/COST RATIO TEST

Low Truck Cost

	TOTAL CAR LOADS	R/V 1.3 BOTH FLAG 13	R/V 1.4 BOTH FLAG 13	R/V 1.5 BOTH FLAG 13	R/V 1.6 BOTH FLAG 13	R/V 1.7 BOTH FLAG 13	R/V 1.8 BOTH FLAG 13
44-Cig/Cigaret/Manu Tobac	139	0.00	0.00	0.00	0.00	0.00	0.00
45-Textile Products	233	0.43	0.43	0.43	0.43	0.43	0.43
46-Pulpwood Logs	4820	0.52	0.33	0.17	0.10	0.10	0.06
47-Pulpwood Chips	3147	0.89	0.64	0.51	0.35	0.29	0.13
48-Lumber	2786	9.22	6.28	3.59	1.97	0.86	0.54
49-Treated Wood Products	267	2.25	1.87	0.75	0.00	0.00	0.00
50-Wood Posts/Poles/Piling	209	6.22	5.26	3.35	1.91	1.44	0.96
51-Millwk & Oth Lumber Pro	282	2.84	1.06	0.35	0.00	0.00	0.00
52-Plywood or Veneer	1464	5.40	3.48	2.39	0.96	0.41	0.27
53-Hardwd Stock & Floor	32	9.38	6.25	6.25	3.13	0.00	0.00
54-Wood Particle Board	499	12.63	11.62	9.02	7.82	6.81	5.81
55-Furniture	1311	0.61	0.46	0.38	0.08	0.08	0.08
56-Woodpulp & Other Pulps	733	0.68	0.14	0.00	0.00	0.00	0.00
57-Newsprint Paper	236	0.00	0.00	0.00	0.00	0.00	0.00
58-Ground Wood Paper	214	0.47	0.47	0.47	0.00	0.00	0.00
59-Printing Paper	958	0.21	0.10	0.10	0.10	0.00	0.00
60-Wrapping Paper/Pap.Bags	752	0.40	0.13	0.13	0.00	0.00	0.00
61-Pulpboard Exc. Corrugated	3137	1.69	1.31	0.99	0.67	0.41	0.26
62-Pulpboard, Corrugated	155	4.52	4.52	3.87	3.23	2.58	1.29
63-Sanitary Paper Pro	2252	0.84	0.44	0.36	0.09	0.04	0.04
64-Paperboard Box/Contain	243	0.00	0.00	0.00	0.00	0.00	0.00
65-Food Ct/FbCan,Drum/Tube	246	0.81	0.41	0.41	0.41	0.41	0.41
66-Bldg Paper/Bldg Board	536	2.99	1.31	0.75	0.56	0.19	0.19
67-Indus Inorganic Chems	775	1.29	0.90	0.52	0.52	0.52	0.26
68-Barium,Calcium Cmpds	129	1.55	0.78	0.78	0.00	0.00	0.00
69-Sodium Alkalies	519	7.51	6.74	6.36	5.59	4.05	3.08
70-Soda Ash	612	4.74	4.41	4.08	3.76	2.94	2.45
71-Industrial Gases	597	4.86	3.69	3.35	2.51	2.01	1.84
72-Indus Organic Chems	1852	3.89	3.24	2.38	1.78	1.35	1.08
73-Sulphuric Acid	347	11.82	10.09	9.22	8.07	6.34	4.03
74-Anhydrous Ammonia	497	8.65	6.84	4.63	3.02	1.41	1.01
75-Superphosphate	1267	14.44	10.42	7.50	5.52	3.87	3.16
76-Agricul Chems & Fertil	1454	18.84	16.09	12.72	10.18	7.77	5.50
77-Plastic Materials	1010	0.20	0.20	0.20	0.20	0.20	0.20
78-Rubber, Natural/Syn	388	0.00	0.00	0.00	0.00	0.00	0.00
79-Detergents/Oth Clean Prep	181	0.00	0.00	0.00	0.00	0.00	0.00
80-Salt, Rock and Common	823	9.11	6.68	5.47	3.52	1.22	0.36
81-Carbon Blacks	217	15.67	14.29	11.52	10.14	8.76	5.99
82-Petro Refining Pro	1741	0.86	0.80	0.69	0.46	0.23	0.17
83-Petro/LubOils/Greases	408	1.23	1.23	0.74	0.49	0.49	0.00
84-Asphalt Pitches/Tars	298	1.68	1.34	1.34	1.01	0.67	0.00
85-LiqGases/Coal/Petro	839	2.15	1.43	0.95	0.72	0.60	0.12
86-CnstrMt/Asphalt/Asbestos	212	0.00	0.00	0.00	0.00	0.00	0.00

Flag 13 . Rate/Service Differential/
Revenue to Cost Ratio Test

COMBINATION TEST RESULTS
RATE/SERVICE DIFFERENTIAL TEST, INTRAMODEL COMPETITION TEST AND REVENUE/COST RATIO TEST

Low Truck Cost

	TOTAL CAR LOADS	R/V 1.3 BOTH FLAG 13	R/V 1.4 BOTH FLAG 13	R/V 1.5 BOTH FLAG 13	R/V 1.6 BOTH FLAG 13	R/V 1.7 BOTH FLAG 13	R/V 1.8 BOTH FLAG 13
87-Petroleum Coke	612	4.41	3.92	3.43	2.94	1.96	1.80
88-Coke from Coal	2143	0.79	0.51	0.19	0.14	0.09	0.09
89-Tires & Tubes, Rubber	930	0.11	0.00	0.00	0.00	0.00	0.00
90-Plastic Products	413	0.73	0.48	0.48	0.00	0.00	0.00
91-Glass Containers	100	11.00	9.00	9.00	8.00	8.00	8.00
92-Hydraulic Cement	1941	5.92	4.74	3.14	2.27	1.34	0.88
93-Brik/Bloc, Clay/Shale	607	13.51	6.26	3.46	1.32	0.49	0.33
94-Clay Refractories	218	11.93	9.63	7.80	6.42	4.13	2.75
95-Lime	500	7.20	5.00	3.20	2.40	1.80	1.40
96-Gypsum Bldg Materials	205	4.88	3.90	3.90	1.95	1.95	0.98
97-Mineral Wool	618	1.46	0.32	0.00	0.00	0.00	0.00
98-Pig Iron	103	1.94	1.94	0.97	0.97	0.97	0.00
99-Semi-Finished Steel	910	0.00	0.00	0.00	0.00	0.00	0.00
100-Mnfc Iron or Steel	2607	0.23	0.15	0.08	0.04	0.04	0.04
101-Iron/Stl Pipe,Tube/Fittng	495	0.00	0.00	0.00	0.00	0.00	0.00
102-Railway Track Material	172	3.49	2.91	2.33	1.74	0.58	0.00
103-Ferroalloys	97	2.06	1.03	1.03	0.00	0.00	0.00
104-Primary Copper Pro	225	0.00	0.00	0.00	0.00	0.00	0.00
105-Primary Zinc Pro	40	0.00	0.00	0.00	0.00	0.00	0.00
106-Primary Aluminum Pro	355	0.00	0.00	0.00	0.00	0.00	0.00
107-Bras/Brz/Cpr BasicShapes	29	0.00	0.00	0.00	0.00	0.00	0.00
108-Aluminum Basic Shapes	282	0.00	0.00	0.00	0.00	0.00	0.00
109-Metal Containers	191	0.00	0.00	0.00	0.00	0.00	0.00
110-Farm Machinery	285	0.00	0.00	0.00	0.00	0.00	0.00
111-Heavy Machinery	349	0.29	0.29	0.29	0.00	0.00	0.00
112-Maj Hsehld Appliances	906	0.11	0.00	0.00	0.00	0.00	0.00
113-Household Appliances	30	0.00	0.00	0.00	0.00	0.00	0.00
114-Psngr Cars, Assembled	1907	0.00	0.00	0.00	0.00	0.00	0.00
115-Vhcles-Asm Exc PasCars	887	0.00	0.00	0.00	0.00	0.00	0.00
116-Motor Vehicle Parts	5480	0.00	0.00	0.00	0.00	0.00	0.00
117-Loco/Railway Car Pts	145	0.00	0.00	0.00	0.00	0.00	0.00
118-Iron or Steel Scrap	3207	0.41	0.37	0.22	0.19	0.06	0.03
119-Non-Ferrous Mtl Scrap	285	1.75	1.05	0.35	0.00	0.00	0.00
120-Textile Waste/Scrap	209	3.35	2.87	2.39	1.44	0.96	0.96
121-Paper Waste/Scrap	1057	4.35	2.18	1.32	0.85	0.76	0.57
122-Chem/Petro Waste	66	0.00	0.00	0.00	0.00	0.00	0.00
123-Ship Cont, R'd Empty	455	4.40	4.18	3.08	1.54	0.88	0.22
124-Freight Forwarder Traf	161	0.00	0.00	0.00	0.00	0.00	0.00
125-ShipAssoc Traffic	355	1.69	0.00	0.00	0.00	0.00	0.00
126-Misc Mixed Shipments	532	1.13	0.00	0.00	0.00	0.00	0.00
127-All Other	7664	2.56	1.79	1.25	0.85	0.56	0.39
0Total SPC Carloads = 147960							
		2.81	2.16	1.49	1.07	0.74	0.56

Flag 13 : Rate/Service Differential/
Revenue to Cost Ratio Test

COMBINATION TESTS FOR COMPETITIVENESS

	TOTAL CAR LOADS	ORGPR FLAG 19	DSTPR FLAG 19	BOTH FLAG 19	ORGPP FLAG 20	DSTPP FLAG 20	BOTH FLAG 20	FLAG 21
1-Cotton	386	95.34	95.63	95.34	98.19	98.19	98.19	100.00
2-Wheat	3953	93.27	92.11	90.62	97.50	97.09	96.74	100.00
3-Corn & Sorghum Grains	4084	82.37	81.56	78.92	93.95	93.29	92.87	100.00
4-Barley	542	87.82	88.93	86.53	99.63	99.82	99.63	100.00
5-Grain, All Other	550	62.36	61.82	59.27	39.45	89.45	69.09	100.00
6-Soybeans	937	75.27	71.80	70.25	89.61	88.05	87.34	100.00
7-Rice	245	81.63	81.22	78.79	100.00	100.00	100.00	100.00
8-Potatoes, Other Than Sweet	348	78.16	81.03	76.44	95.98	95.98	95.69	100.00
9-Sugar Beets	603	99.34	98.34	98.34	99.83	99.83	99.83	100.00
10-Citrus Fruits	69	73.91	75.36	69.57	84.06	82.61	81.16	100.00
11-Apples	20	95.00	95.00	95.00	100.00	100.00	100.00	100.00
12-Deciduous Fruits	29	82.76	82.76	82.76	100.00	100.00	100.00	100.00
13-Fresh Vegetables	253	96.84	96.84	96.44	99.60	99.60	99.60	100.00
14-Melons	35	88.57	88.57	88.57	100.00	100.00	100.00	100.00
15-Iron Ore	2958	95.54	95.84	95.50	99.97	99.97	99.97	100.00
16-Non-Ferrous Concentrates	1033	85.29	87.90	84.32	99.61	99.81	99.61	99.61
17-Cal/Act. Bauxite Ores	694	81.41	82.56	80.98	100.00	100.00	100.00	100.00
18-Anthracite Coal	207	82.13	84.54	81.61	100.00	100.00	100.00	100.00
19-BitCoal Metallurgical	3368	97.30	97.80	97.03	99.91	99.94	99.88	100.00
20-BitCoal: Fuel,Steam	24540	96.81	97.92	96.04	99.92	99.87	99.85	100.00
21-Lignite, Prepared or Raw	338	97.63	97.63	97.63	100.00	100.00	100.00	100.00
22-Limestone & Dolomite	930	93.73	95.06	93.61	100.00	100.00	100.00	100.00
23-Construction Aggregates	5788	92.26	93.66	91.29	100.00	100.00	100.00	100.00
24-Industrial Sand	1364	81.60	83.71	79.25	99.85	99.63	99.63	100.00
25-Clays,Dry Exc. Fire Clay	1073	72.79	76.61	68.87	100.00	100.00	100.00	100.00
26-Feldspar	52	38.46	40.38	38.46	100.00	100.00	100.00	100.00
27-Potash Fertilizers	1592	76.32	81.60	75.31	99.75	99.75	99.75	99.94
28-Phosphate Rock	1527	99.08	99.21	99.08	100.00	100.00	100.00	100.00
29-Fr Meats & Packnghse Pro	86	100.00	100.00	100.00	100.00	100.00	100.00	100.00
30-Can/Pres Fruits & Veges	445	90.56	90.56	89.83	99.78	99.78	99.78	100.00
31-Oth Foodstuf Ca/Ps/Pp	2116	91.97	90.69	88.79	99.79	99.79	99.75	99.67
32-Froz Fruits Veges	548	82.85	85.94	81.57	99.82	99.82	99.82	97.26
33-Wheat Flour Milling Pro	1972	83.47	81.69	77.84	99.95	99.75	99.75	98.94
34-Dry Corn Milling Pro	177	66.67	66.10	59.89	100.00	100.00	100.00	100.00
35-Other Grain Mill Pro	2518	85.39	94.75	82.92	99.76	99.64	99.64	99.44
36-Wet Corn Milling Pro	604	75.66	71.35	67.72	99.01	98.68	98.68	90.18
37-Cereal Prep (Cooked)	653	99.08	99.08	98.77	99.85	99.85	99.85	98.93
38-Sugar: Ref/Cane/Beet	777	85.64	87.26	92.11	99.87	100.00	99.87	95.47
39-Malt Liquors	1141	94.31	94.10	93.13	100.00	100.00	100.00	100.00
40-Wines and Brandy	185	66.49	68.11	61.62	100.00	100.00	100.00	100.00
41-Alcoholic Liquors	165	93.33	92.73	92.73	100.00	100.00	100.00	93.18
42-Commercial Fats & Oils	1115	84.48	83.59	81.52	99.92	93.82	99.82	93.91
43-Seed/Nut/Vege Cake,Meal	960	75.94	74.27	71.35	99.79	99.79	99.79	99.48

COMBINATION TESTS FOR COMPETITIVENESS

	TOTAL CAR LOADS	ORGRR FLAG 19	DSTRR FLAG 19	OTH FLAG 19	ORGRR FLAG 20	DSTRR FLAG 20	OTH FLAG 20	FLAG 21
44-Cig/Cigaret/Manu Tobac	139	100.00	100.00	100.00	100.00	100.00	100.00	100.00
45-Textile Products	233	96.57	95.71	95.71	100.00	100.00	100.00	100.00
46-Pulpwood Logs	4826	97.49	97.20	96.72	99.98	99.98	99.98	96.94
47-Pulpwood Chips	3117	97.39	97.33	97.11	99.97	99.97	99.94	98.32
48-Lumber	2786	72.97	74.16	64.61	99.25	99.25	98.78	99.78
49-Treated Wood Products	267	68.16	66.67	64.04	98.88	98.88	98.98	100.00
50-Wood Posts/Poles/Piling	209	66.03	65.07	63.64	98.56	98.56	98.56	98.56
51-Millwk & Oth Lumber Pro	282	45.04	45.74	42.20	99.29	99.29	99.29	100.00
52-Plywood or Veneer	1464	76.91	77.89	71.31	98.63	98.50	98.22	99.59
53-Hardwd Stock & Floor	32	28.13	28.13	28.13	100.00	100.00	100.00	100.00
54-Wood Particle Board	499	55.91	58.12	51.90	100.00	100.00	100.00	99.80
55-Furniture	1316	81.38	83.21	79.03	99.92	99.92	99.92	100.00
56-Woodpulp & Other Pulps	733	90.04	88.81	87.45	98.77	98.64	98.50	91.27
57-Newsprint Paper	236	99.58	100.00	95.15	99.58	100.00	99.15	94.07
58-Ground Wood Paper	214	95.33	94.86	94.86	99.07	99.07	99.07	95.33
59-Printing Paper	958	92.80	94.15	92.28	99.79	99.90	99.79	97.49
60-Wrapping Paper/Pap.Bags	752	87.77	88.70	87.23	99.47	99.47	99.20	96.28
61-Pulpboard Exc. Corrugated	3137	93.75	93.95	92.16	99.78	99.65	99.62	99.36
62-Pulpboard, Corrugated	155	89.68	89.68	89.68	100.00	100.00	100.00	99.35
63-Sanitary Paper Pro	2254	85.18	84.96	81.99	99.42	99.20	99.16	98.00
64-Paperboard Box/Contain	243	92.18	92.59	92.18	100.00	100.00	100.00	97.94
65-Food Ct/FbCan,Drum/Tube	246	77.64	77.24	76.42	99.19	99.19	99.19	95.53
66-Bldg Paper/Bldg Board	536	67.72	70.71	66.42	99.25	99.25	99.25	98.13
67-Indus Inorganic Chems	775	87.23	89.13	86.52	99.46	99.48	99.48	99.48
68-Barium,Calcium Cmpds	129	80.62	85.27	80.62	100.00	100.00	100.00	100.00
69-Sodium Alkalies	519	84.39	84.78	81.89	99.61	99.61	99.61	98.27
70-Soda Ash	612	90.03	92.16	89.38	100.00	100.00	100.00	100.00
71-Industrial Gases	597	87.60	87.44	86.60	99.33	99.16	98.99	95.98
72-Indus Organic Chems	1852	90.12	89.20	86.93	99.84	99.78	99.78	97.89
73-Sulphuric Acid	347	77.23	81.27	74.35	99.71	100.00	99.71	99.42
74-Anhydrous Ammonia	497	81.49	82.49	81.09	100.00	100.00	100.00	97.38
75-Superphosphate	1268	68.93	78.71	67.74	99.66	99.68	99.68	100.00
76-Agricul Chems & Fertil	1451	52.89	57.63	49.93	99.52	99.72	99.52	99.59
77-Plastic Materials	1010	85.64	86.53	82.57	99.41	99.41	99.21	97.23
78-Rubber, Natural/Syn	388	95.36	94.85	94.07	99.48	99.48	99.48	98.71
79-Detergents/Oth Clean Prep	181	96.13	96.13	96.13	100.00	100.00	100.00	100.00
80-Salt, Rock and Common	923	76.74	79.59	76.17	99.39	99.39	99.39	99.03
81-Carbon Blacks	217	53.92	54.84	47.00	98.16	98.62	98.16	93.09
82-Petro Refining Pro	1741	95.81	95.92	94.95	99.94	99.94	99.91	99.60
83-Petro/LubOils/Greases	408	92.65	93.38	92.16	100.00	100.00	100.00	99.75
84-Asphalt Pitches/Tars	298	90.60	90.27	90.27	100.00	100.00	100.00	99.33
85-LiqGases/Coal/Petro	839	89.39	89.99	87.96	99.96	99.88	99.88	98.81
86-Constrct/Asphalt/Asbesto	212	92.92	92.92	92.92	100.00	100.00	100.00	100.00

COMBINATION TESTS FOR COMPETITIVENESS

	TOTAL CAR LOADS	URCRR FLAG 19	DSTRR FLAG 15	LOIU FLAG 19	UPGPI FLAG 25	DSTPP FLAG 24	BOTH FLAG 29	FLAG 21
87-Petroleum Coke	512	90.52	89.22	88.45	100.00	100.00	100.00	100.00
88-Coke from Coal	2143	92.53	92.55	91.13	100.00	100.00	100.00	100.00
89-Tires & Tubes, Rubber	930	96.24	95.24	95.70	100.00	100.00	100.00	100.00
90-Plastic Products	413	90.31	90.56	89.59	100.00	100.00	100.00	100.00
91-Glass Containers	103	68.09	67.90	66.07	100.00	100.00	100.00	100.00
92-Hydraulic Cement	1941	84.65	85.91	82.99	100.00	100.00	100.00	100.00
93-Brik/Bloc, Clay/Shale	607	44.99	45.30	37.23	99.51	99.84	99.51	99.34
94-Clay Refractories	218	54.13	52.75	50.00	99.62	97.71	97.71	92.20
95-Lime	500	86.60	32.49	78.43	99.40	99.40	99.40	94.20
96-Gypsum Bldg Materials	205	81.46	85.85	80.49	100.00	100.00	100.00	100.00
97-Mineral Wool	618	76.54	78.32	73.79	99.84	99.84	99.84	99.84
98-Pig Iron	103	72.82	75.73	70.87	100.00	100.00	100.00	100.00
99-Semi-Finished Steel	910	99.45	90.67	96.34	100.00	100.00	100.00	96.70
100-Mnfc Iron or Steel	2617	98.67	98.51	98.47	99.92	99.92	99.92	99.08
101-Iron/Stl Pipe,Tube/Fitting	495	99.39	99.60	99.39	100.00	100.00	100.00	94.14
102-Railway Track Material	172	81.98	81.40	80.81	100.00	100.00	100.00	100.00
103-Ferroalloys	97	81.44	82.47	81.44	100.00	100.00	100.00	100.00
104-Primary Copper Pro	225	99.56	99.56	99.56	100.00	100.00	100.00	99.33
105-Primary Zinc Pro	40	92.50	92.50	92.50	100.00	100.00	100.00	100.00
106-Primary Aluminum Pro	255	98.87	98.87	96.87	100.00	100.00	100.00	100.00
107-Bras/Brz/Cpr BasicShapes	29	96.55	96.55	96.55	100.00	100.00	100.00	100.00
108-Aluminum Basic Shapes	282	99.65	99.29	99.29	100.00	100.00	100.00	100.00
109-Metal Containers	191	93.72	94.24	93.72	100.00	100.00	100.00	97.19
110-Farm Machinery	295	100.00	100.00	100.00	100.00	100.00	100.00	100.00
111-Heavy Machinery	343	97.13	96.85	96.85	99.43	99.43	99.43	100.00
112-Maj Hsehld Appliances	966	95.81	95.92	95.47	99.78	99.78	99.78	100.00
113-Household Appliances	31	100.00	100.00	100.00	100.00	100.00	100.00	100.00
114-Psngr Cars, Assembled	1907	96.64	90.64	91.53	99.90	99.90	99.90	100.00
115-Vhcles-Asm exc PasCars	387	100.00	100.00	100.00	100.00	100.00	100.00	100.00
116-Motor Vehicle Parts	5480	99.89	99.87	99.65	100.00	100.00	100.00	100.00
117-Loco/Railway Car Etc	145	100.00	99.31	99.31	100.00	100.00	100.00	100.00
118-Iron or Steel Scrap	3297	97.66	97.69	97.41	99.97	99.97	99.97	99.97
119-Non-Ferrous Mtl Scrap	285	86.67	85.96	85.96	100.00	100.00	100.00	100.00
120-Textile Waste/Scrap	209	39.23	42.11	35.89	99.52	99.52	99.52	100.00
121-Paper Waste/Scrap	1057	66.10	66.23	62.67	100.00	100.00	100.00	100.00
122-Chem/Petro Waste	66	98.30	99.33	86.39	100.00	100.00	100.00	100.00
123-Ship Cont, Rtd Empty	455	63.52	61.76	59.56	100.00	100.00	100.00	100.00
124-Freight Forwarder Traf	161	80.75	83.23	80.12	100.00	100.00	100.00	100.00
125-Shipassoc Traffic	355	85.35	84.79	80.56	100.00	100.00	100.00	100.00
126-Misc Mixed Shipments	537	94.40	93.27	90.26	100.00	100.00	100.00	100.00
127-All Other	7666	82.09	81.39	74.17	100.00	100.00	100.00	100.00
0Total TPR Carloads = [illegible]		89.33	89.8[illegible]	87.6[illegible]	99.40	99.44	99.40	99.47

TRUCK/RAIL COST RATIO STATISTICS FOR SERVICE ONLY

SPC	Description	Mean of Ratios	Competitive Standard Deviation of Ratios	Traffic Carloads in This Category
1	Cotton	1.17	0.59	130
2	Wheat	1.05	0.27	85
3	Corn and Sorghum	1.05	0.03	61
4	Barley	1.04	0.02	21
5	All Other Grain	1.06	0.03	3
6	Soybeans	1.11	0.39	46
7	Rice	1.11	0.04	8
8	Potatoes	1.01	0.01	11
9	Sugar Beets	-	-	-
10	Citrus Fruits	1.06	-	1
11	Apples	1.02	0.02	2
12	Deciduous Fruits	1.04	0.04	2
13	Fresh Vegatables	1.04	0.03	22
14	Melons	1.03	0.02	4
15	Iron Ore	-	-	-
16	Non-Ferrous Conc.	1.87	1.43	476

SPC	Description	Mean of Ratios	Competitive Standard Deviation of Ratios	Traffic Carloads in This Category
17	Bauxite Ores	1.02	-	1
18	Anthracite Coal	-	-	-
19	Metal. Bit. Coal	-	-	-
20	Steam Bit. Coal	-	-	-
21	Lignite	-	-	-
22	Flux Limestone	-	-	-
23	Const. Aggr.	-	-	-
24	Ind. Sand	1.01	-	1
25	Dry Clay	-	-	-
26	Feldspar	-	-	-
27	Potash Fert.	1.03	-	2
28	Phospate Rock	-	-	-
29	Fresh Meat	1.23	0.19	49
30	Canned Fruits and Veg.	1.31	0.29	255
31	Other Canned Foods	1.32	0.25	994
32	Frozen Fruits and Veg.	1.30	0.17	236

SPC	Description	Mean of Ratios	Competitive Standard Deviation of Ratios	Traffic Carloads in This Category
33	Wheat Milling Prod.	1.27	0.29	407
34	Dry Corn Mill Prod.	1.39	0.32	48
35	Other Grain Mill Prod.	1.48	2.69	729
36	Wet Corn Mill Prod.	1.24	0.18	152
37	Cooked Cereals	1.34	0.38	343
38	Refined Sugar	1.67	0.68	324
39	Malt Liquors	1.31	0.21	763
40	Wines and Brandy	1.20	0.16	20
41	Alcoholic Liquors	1.41	0.34	98
42	Fats and Oils	1.38	0.29	498
43	Seed, Nut, Veg. Cake	1.81	3.01	460
44	Cigars, Cigarettes	1.31	0.29	100
45	Textile Prod.	1.58	0.34	151
46	Pulpwood Logs	-	-	-
47	Pulpwood Chips	-	-	-
48	Lumber	1.34	0.27	547

SPC	Description	Mean of Ratios	Competitive Standard Deviation of Ratios	Traffic Carloads in This Category
81	Carbon Black	1.10	0.07	15
82	Petroleum Ref. Prod.	1.74	0.95	1,259
83	Petrol. Oil and Grease	1.54	0.90	277
84	Asphalt	1.65	2.08	189
85	Liq. Gas, Coal, etc.	1.57	0.30	544
86	Constr. Mtls.	1.36	0.26	164
87	Petrol. Coke	-	-	-
88	Coke	1.05	0.02	5
89	Tires and Tubes	1.43	0.48	635
90	Plastic Products	1.40	0.49	233
91	Glass Containers	1.20	0.17	23
92	Hydraulic Cement	-	-	-
93	Brick or Blocks	-	-	-
94	Clay Refractories	1.12	0.66	30
95	Lime	-	-	-
96	Gypsum Bldg. Mtls.	1.43	0.55	91

SPC	Description	Mean of Ratios	Competitive Standard Deviation of Ratios	Traffic Carloads in This Category
97	Mineral Wool	1.20	0.23	170
98	Pig Iron	1.38	0.09	31
99	Semi-Fin. Steel	1.44	0.31	297
100	Mfd. Iron or Steel	1.32	0.34	701
101	Iron or Steel Pipe	1.25	0.36	239
102	Ry. Track Mtl.	1.31	4.58	78
103	Ferroalloys	1.57	0.42	60
104	Prim. Copper Prod.	1.76	0.45	151
105	Prim. Zinc Prod.	1.48	0.26	34
106	Prim Alum. Prod.	1.56	1.27	307
107	Copper Shapes	1.60	0.35	24
108	Alum Shapes	1.48	0.40	233
109	Metal Containers	1.46	0.56	124
110	Farm Machinery	1.27	0.59	43
111	Heavy Machinery	1.31	0.45	76
112	Maj. Hsehld. Appliances	1.25	0.30	442

SPC	Description	Mean of Ratios	Competitive Standard Deviation of Ratios	Traffic Carloads in This Category
113	Household Appliances	1.37	0.28	13
114	Automobiles	2.44	0.46	1,626
115	Other Motor Vehicles	1.36	0.75	7
116	Motor Vehicle Parts	1.45	0.34	2,344
117	Loco. or Car Parts	1.61	0.65	67
118	Ferrous Scrap	1.10	0.23	348
119	Non-Ferrous Scrap	1.19	0.12	81
120	Textile Waste	1.14	0.08	17
121	Paper Waste	1.14	0.11	153
122	Chemical Waste	1.73	0.69	37
123	Empty Containers	1.03	0.02	15
124	Frt. Forwarder Traf.	1.40	0.11	3
125	Ship. Assn Traf.	1.28	1.30	22
126	Misc. Mixed	1.26	0.46	133
127	All Other	1.61	1.02	2,780
All Rail Traffic		1.52	0.89	31,200

Source: A. T. Kearney, Inc., Analysis of Specially Edited 1977 One Percent Waybill Sample, excluding TOFC/COFC.

EXHIBIT V-12
Page 8 of 8

CORRELATION MATRIX FOR THE RELIABILITY ANALYSIS

	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8
tem 1	1.000,00							
tem 2	0.622,60	1.000,00						
tem 3	0.009,97	0.178,03	1.000,00					
tem 4	0.473,30	-0.148,63	-0.172,75	1.000,00				
tem 5	-0.235,12	-0.298,26	-0.270,82	0.023,38	1.000,00			
tem 6	0.227,31	0.363,82	-0.020,18	0.506,22	-0.080,71	1.000,00		
tem 7	0.803,49	0.497,83	-0.059,18	0.381,21	-0.191,47	0.192,97	1.000,00	
:em 8	-0.206,17	-0.249,23	-0.037,77	-0.031,00	0.203,44	-0.115,42	-0.181.69	1.000,00

:em 1 Transportation Rate Differential Ratio Test

:em 2 Rate/Service Differential Test

:em 3 Market Share Trend Test

:em 4 Intramodal Competition Test

:em 5 Demand Stability Test

:em 6 Rate/Service Different/Intramodal Competition Test

:em 7 Transportation Rate Differential Ratio/Intramodal Competition Test

:em 8 Revenue/cost Ratio Test

›urces: A. T. Kearney, Inc., Analysis of 1977 One Percent Waybill Sample, Excluding TOFC/COFC

EXHIBIT V-13

CELL LEVEL STATISTICS FOR SPC 1, COTTON

SPC•C01 Cotton

Mileage	Weight (tons)	Territory	Number Records	Total Carload	Max Score	Mean Score	Standard Deviation	Mode	Increasing Share(%)	Cost Test 1.4	Cost Test 1.8	Stab
0 - 150	0 - 55	Official	1	1	1	1.00	0.00	1	100.0%	100.0%	100.0%	0.0%
0 - 150	0 - 55	Southern	43	43	3	0.60	0.73	0	48.8%	11.6%	4.6%	4.6%
0 - 150	0 - 55	Southwestern	18	18	1	0.50	0.51	0	50.0%	5.5%	0.0%	0.0%
0 - 150	126 - up	Southern	2	6	1	0.33	0.52	0	33.3%	33.3%	0.0%	0.0%
0 - 150	126 - up	Southwestern	1	2	1	1.00	0.00	1	100.0%	0.0%	0.0%	0.0%
151 - 300	0 - 55	Southern	28	28	3	0.64	0.83	0	32.1%	32.1%	14.2%	7.1%
151 - 300	0 - 55	Southwestern	5	5	1	0.60	0.55	1	60.0%	20.0%	0.0%	0.0%
151 - 300	126 - up	Official	1	2	1	1.00	0.00	1	100.0%	0.0%	0.0%	0.0%
151 - 300	126 - up	Southern	7	16	3	1.25	1.13	1	62.5%	12.5%	0.0%	25.0%
301 - 600	0 - 55	Southern	26	26	3	1.15	1.12	1	65.3%	65.3%	11.5%	23.0%
301 - 600	0 - 55	Southwestern	37	37	2	0.76	0.72	1	29.7%	48.6%	8.1%	0.0%
301 - 600	56 - 80	Southern	1	1	3	3.00	0.00	3	100.0%	100.0%	100.0%	100.0%
301 - 600	126 - up	Official	1	2	3	3.00	0.00	3	100.0%	0.0%	0.0%	100.0%
301 - 600	126 - up	Southern	2	4	3	3.00	0.00	3	100.0%	50.0%	0.0%	100.0%
601 - 1200	0 - 55	Official	1	1	0	0.00	0.00	0	0.0%	100.0%	100.0%	0.0%
601 - 1200	0 - 55	Southern	34	34	5	1.94	1.63	3	67.6%	55.8%	26.4%	52.9%
601 - 1200	0 - 55	Western Trunk	1	1	1	1.00	0.00	1	100.0%	100.0%	100.0%	0.0%
601 - 1200	0 - 55	Southwestern	50	50	3	1.74	1.10	1	72.0%	44.0%	4.0%	40.0%
601 - 1200	0 - 55	Mountain-Pacific	1	1	0	0.00	0.00	0	0.0%	0.0%	0.0%	0.0%
601 - 1200	81 - 125	Official	1	1	5	5.00	0.00	5	100.0%	0.0%	0.0%	100.0%
601 - 1200	126 - up	Southern	4	8	5	4.00	1.07	3	100.0%	25.0%	0.0%	100.0%
1201 - up	0 - 55	Southwestern	45	45	5	2.07	1.16	1	51.1%	31.1%	2.2%	16.6%
1201 - up	0 - 55	Mountain-Pacific	54	54	5	2.39	1.25	2	25.9%	25.9%	0.0%	25.9%

EXHIBIT V-14

CELL LEVEL STATISTICS FOR SPC 91, GLASS CONTAINERS

SPC:091 Glass Containers

Mileage	Weight (tons)	Territory	Number Records	Total Carload	Max Score	Mean Score	Standard Deviation	Mode	Increasing Share(%)	Cost Test 1.4	Cost Test 1.8	Stab
0 - 150	0 - 55	Official	10	10	1	1.00	0.00	1	100.0%	0.0%	0.0%	0.0%
0 - 150	0 - 55	Mountain-Pacific	1	1	1	1.00	0.00	1	100.0%	0.0%	0.0%	0.0%
151 - 300	0 - 55	Official	2	2	1	1.00	0.00	1	100.0%	0.0%	0.0%	0.0%
151 - 300	0 - 55	Western Trunk	4	4	1	0.50	0.58	0	50.0%	0.0%	0.0%	0.0%
151 - 300	56 - 80	Official	2	2	2	1.50	0.71	1	0.0%	100.0%	100.0%	0.0%
151 - 300	81 - 125	Official	1	1	5	5.00	0.00	5	100.0%	100.0%	100.0%	100.0%
301 - 600	0 - 55	Official	7	7	3	1.57	0.98	1	57.1%	14.2%	0.0%	28.5%
301 - 600	0 - 55	Western Trunk	4	4	2	1.25	0.50	1	25.0%	75.0%	0.0%	0.0%
301 - 600	0 - 55	Southwestern	6	6	3	2.33	1.03	3	100.0%	33.3%	16.6%	66.6%
601 - 1200	0 - 55	Official	17	17	5	2.88	1.32	2	52.9%	11.7%	5.8%	47.0%
601 - 1200	0 - 55	Southern	3	3	2	2.00	0.00	2	0.0%	0.0%	0.0%	0.0%
601 - 1200	0 - 55	Western Trunk	3	3	5	5.00	0.00	5	100.0%	0.0%	0.0%	100.0%
601 - 1200	0 - 55	Southwestern	10	10	5	1.90	2.18	1	30.0%	70.0%	50.0%	30.0%
601 - 1200	0 - 55	Mountain-Pacific	1	1	3	3.00	0.00	3	100.0%	100.0%	0.0%	100.0%
601 - 1200	56 - 80	Southern	1	1	5	5.00	0.00	5	100.0%	100.0%	100.0%	100.0%
601 - 1200	81 - 125	Official	2	2	5	5.00	0.00	5	100.0%	100.0%	100.0%	100.0%
601 - 1200	81 - 125	Western Trunk	1	1	5	5.00	0.00	5	100.0%	100.0%	100.0%	100.0%
1201 - up	0 - 55	Official	7	7	5	4.71	0.76	5	100.0%	28.5%	0.0%	100.0%
1201 - up	0 - 55	Western Trunk	7	7	5	3.00	1.91	5	71.4%	71.4%	71.4%	42.8%
1201 - up	0 - 55	Southwestern	10	10	5	4.80	0.63	5	100.0%	40.0%	10.0%	100.0%
1201 - up	81 - 125	Southwestern	1	1	5	5.00	0.00	5	100.0%	100.0%	100.0%	100.0%

SPC 2 Wheat

SPC LEVEL STATISTICS FOR SPC 2, WHEAT

Number of Carloads: 3,953
Number of Cells: 70
Number of Records: 3,771

Units of analysis: Carloads
1.78 Mean of the Scores.
2 Mode of the Scores.
0.99 Standard deviation of the Scores.
38 Number of Unstable Demand Carloads.
0.9% Percent of Unstable Demand Carloads.
1,025 Number of Non-compensatory Carloads.
25.9% Percent of Non-compensatory Carloads.
11.4% Percent Carloads with stable or increasing market share.
54.1% Percent Carloads passing REVENUE/VARIABLE Cost > 1.4.
35.2% Percent Carloads passing REVENUE/VARIABLE Cost > 1.8.
9.4% Percent Carloads with stable demand.

	Passing No Items	1 Item	2 Items	3 Items	4 Items	5 Items
Number of Carloads	866	209	2,499	16	0	363
Number of Cells:	9	15	26	6	1	13

	Item 1	Item 2	Item 3	Item 4	Item 5
Number of Carloads:	2,947	2,928	153	370	372

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EXHIBIT V-16

SPC LEVEL STATISTICS FOR SPC 13, FRESH VEGETABLES

SPC 13 Fresh Vegetables

Number of Carloads: 253
Number of Cells: 8
Number of Records: 253

Units of analysis: Carloads
1.01 Mean of the Scores.
0 Mode of the Scores.
0.60 Standard deviation of the Scores.
0 Number of Unstable Demand Carloads.
0.0% Percent of Unstable Demand Carloads.
83 Number of Non-compensatory Carloads.
32.8% Percent of Non-compensatory Carloads.
31.2% Percent Carloads with stable or increasing market share.
1.1% Percent Carloads passing REVENUE/VARIABLE Cost > 1.4.
0.3% Percent Carloads passing REVENUE/VARIABLE Cost > 1.8.
5.9% Percent Carloads with stable demand.

	Passing No Items	1 Item	2 Items	3 Items	4 Items	5 Items
Number of Carloads	102	85	44	13	0	9
Number of Cells:	3	3	2	0	0	0

	Item 1	Item 2	Item 3	Item 4	Item 5
Number of Carloads:	75	72	79	16	15

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EXHIBIT V-17

SPC 55 Furniture

Number of Carloads: 1,316
Number of Cells: 35
Number of Records: 1,310

Units of analysis: Carloads
2.55 Mean of the Scores.
3 Mode of the Scores.
1.22 Standard deviation of the Scores.
0 Number of Unstable Demand Carloads.
0.0% Percent of Unstable Demand Carloads.
387 Number of Non-compensatory Carloads.
29.4% Percent of Non-compensatory Carloads.
59.3% Percent Carloads with stable or increasing market share.
21.6% Percent Carloads passing REVENUE/VARIABLE Cost > 1.4.
3.2% Percent Carloads passing REVENUE/VARIABLE Cost > 1.8.
53.2% Percent Carloads with stable demand.

	Passing No Items	1 Item	2 Items	3 Items	4 Items	5 Items
umber of Carloads	79	360	176	425	0	276
umber of Cells:	5	7	6	12	1	4

	Item 1	Item 2	Item 3	Item 4	Item 5
umber of Carloads:	1,157	452	781	276	701

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EXHIBIT V-18

SPC LEVEL STATISTICS FOR SPC 72, INDUSTRIAL ORGANIC CHEMICALS

SPC 72 Industrial Organic Chemicals

Number of Carloads: 1,852
Number of Cells: 81
Number of Records: 1,839

Units of analysis: Carloads
2.05 Mean of the Scores.
2 Mode of the Scores.
1.03 Standard deviation of the Scores.
11 Number of Unstable Demand Carloads.
0.5% Percent of Unstable Demand Carloads.
180 Number of Non-compensatory Carloads.
9.7% Percent of Non-compensatory Carloads.
37.1% Percent Carloads with stable or increasing market share.
64.1% Percent Carloads passing REVENUE/VARIABLE Cost > 1.4.
38.7% Percent Carloads passing REVENUE/VARIABLE Cost > 1.8.
27.6% Percent Carloads with stable demand.

	Passing No Items	1 Item	2 Items	3 Items	4 Items	5 Items
Number of Carloads	199	506	632	273	0	242
Number of Cells:	11	27	24	13	2	4

	Item 1	Item 2	Item 3	Item 4	Item 5
Number of Carloads:	1,477	877	688	245	512

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EXHIBIT V-19

SPC LEVEL STATISTICS FOR SPC 100, MANUFACTURED IRON OR STEEL

SPC 100 Manufactured Iron or Steel

Number of Carloads: 2,607
Number of Cells: 78
Number of Records: 2,552

Units of analysis: Carloads
- 0.83 Mean of the Scores.
- 0 Mode of the Scores.
- 0.54 Standard deviation of the Scores.
- 6 Number of Unstable Demand Carloads.
- 0.2% Percent of Unstable Demand Carloads.
- 233 Number of Non-compensatory Carloads.
- 8.9% Percent of Non-compensatory Carloads.
- 34.4% Percent Carloads with stable or increasing market share.
- 72.1% Percent Carloads passing REVENUE/VARIABLE Cost > 1.4.
- 42.2% Percent Carloads passing REVENUE/VARIABLE Cost > 1.8.
- 14.3% Percent Carloads with stable demand.

	Passing No Items	1 Item	2 Items	3 Items	4 Items	5 Items
Number of Carloads	1,297	891	44	335	0	40
Number of Cells:	26	33	11	6	1	1

	Item 1	Item 2	Item 3	Item 4	Item 5
Number of Carloads:	785	95	899	41	374

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EXHIBIT V-20

SUMMARY OF SPC LEVEL STATISTICS

Summary for all S.P.C. Commodity Codes

Number of Carloads: 147,986
Number of Cells: 5,365
Number of Records: 140,134

Units of analysis: Carloads
- 2.02 Mean of the Scores.
- 2 Mode of the Scores.
- 1.10 Standard deviation of the Scores.
- 1,722 Number of Unstable Demand Carloads.
- 1.1% Percent of Unstable Demand Carloads.
- 42,611 Number of Non-compensatory Carloads.
- 28.7% Percent of Non-compensatory Carloads.
- 25.9% Percent Carloads with stable or increasing market share.
- 39.9% Percent Carloads passing REVENUE/VARIABLE Cost > 1.4.
- 17.5% Percent Carloads passing REVENUE/VARIABLE Cost > 1.8.
- 20.6% Percent Carloads with stable demand.

	Passing No Items	1 Item	2 Items	3 Items	4 Items	5 Items
Number of Carloads	16,831	29,435	70,838	12,569	0	18,313
Number of Cells:	627	1,396	1,487	1,034	245	576

	Item 1	Item 2	Item 3	Item 4	Item 5
Number of Carloads:	120,351	92,427	38,410	18,662	30,533

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EXHIBIT V-21

SPC COMMODITIES AND THEIR MEAN SCORES

SPC	Description	Mean Score	St. Dev.
1	Cotton	1.48	1.00
2	Wheat	1.78	0.99
3	Corn and Sorghum	2.48	1.63
4	Barley	2.06	0.99
5	All Other Grain	3.12	1.33
6	Soybeans	2.72	1.72
7	Rice	2.39	1.37
8	Potatoes	2.09	1.53
9	Sugar Beets	1.72	0.68
10	Citrus Fruits	2.81	1.13
11	Apples	1.05	0.92
12	Deciduous Fruits	1.75	1.40
13	Fresh Vegatables	1.01	0.60
14	Melons	1.68	1.05
15	Iron Ore	2.11	0.56
16	Non-Ferrous Conc.	2.01	1.24
17	Bauxite Ores	2.51	1.14
18	Anthracite Coal	2.54	0.67
19	Metal. Bit. Coal	2.06	0.70

SPC	Description	Mean Score	St. Dev.
20	Steam Bit. Coal	2.08	0.33
21	Lignite	1.82	0.59
22	Flux Limestone	2.18	0.43
23	Const. Aggr.	2.23	0.70
24	Ind. Sand	2.50	1.16
25	Dry Clay	2.87	1.12
26	Feldspar	3.67	1.43
27	Potash Fert.	2.58	1.25
28	Phospate Rock	1.88	0.56
29	Fresh Meat	1.79	0.48
30	Canned Fruits and Veg.	2.06	1.07
31	Other Canned Foods	1.73	1.21
32	Frozen Fruits and Veg.	2.11	1.33
33	Wheat Milling Prod.	2.27	1.34
34	Dry Corn Mill Prod.	3.10	1.39
35	Other Grain Mill Prod.	1.89	1.40
36	Wet Corn Mill Prod.	2.75	1.40
37	Cooked Cereals	1.09	0.49
38	Refined Sugar	2.15	1.34
39	Malt Liquors	1.65	0.85
40	Wines and Brandy	3.04	1.34

SPC	Description	Mean Score	St. Dev.
41	Alcoholic Liquors	2.16	0.95
42	Fats and Oils	2.23	1.26
43	Seed, Nut, Veg. Cake	2.68	1.43
44	Cigars, Cigarettes	1.66	0.56
45	Textile Prod.	1.84	0.99
46	Pulpwood Logs	1.82	0.59
47	Pulpwood Chips	2.06	0.80
48	Lumber	2.90	1.43
49	Treated Wood Prod.	2.97	1.34
50	Wood Posts, etc.	2.88	1.87
51	Millwork	3.70	1.34
52	Plywood	2.75	1.29
53	Hardwood Stock	4.25	0.79
54	Wood Particle Board	3.43	1.29
55	Furniture	2.55	1.22
56	Woodpulp	1.85	1.12
57	Newsprint	1.63	0.43
58	Ground Woodpaper	1.72	0.79
59	Printing Paper	1.99	0.93
60	Wrapping Paper, etc.	2.37	1.09
61	Pulpboard	1.86	0.84

SPC	Description	Mean Score	St. Dev.
62	Corrugated Pulpboard	2.41	0.86
63	Sanitary Paper Prod.	2.04	1.55
64	Paperbd. Boxes etc.	1.95	1.07
65	Food Containers	2.65	1.44
66	Building Paper and Bd.	2.82	1.44
67	Ind. Inorg. Chem	2.20	1.10
68	Barium or Calcium	2.41	1.24
69	Sodium Alkalies	2.21	1.31
70	Soda Ash	2.24	0.27
71	Industrial Gases	1.84	1.25
72	Ind Org. Chem	2.05	1.03
73	Sulphuric Acid	2.50	1.31
74	Anhydrous Ammonia	2.28	1.43
75	Superphosphate	2.66	1.51
76	Agr. Chemicals	3.42	1.40
77	Plastic Materials	2.43	1.12
78	Rubber	1.76	0.92
79	Detergents	1.40	0.82
80	Salt	2.65	1.38
81	Carbon Black	3.50	1.31
82	Petroleum Ref. Prod.	1.52	0.80

SPC	Description	Mean Score	St. Dev.
83	Petrol. Oil and Grease	1.96	1.08
84	Asphalt	1.84	1.27
85	Liq. Gas, Coal, etc.	2.02	1.02
86	Constr. Mtls.	2.30	0.77
87	Petrol. Coke	2.28	0.46
88	Coke	2.16	0.35
89	Tires and Tubes	1.59	0.92
90	Plastic Products	1.98	1.21
91	Glass Containers	2.72	1.48
92	Hydraulic Cement	2.46	1.13
93	Brick or Blocks	3.87	1.11
94	Clay Refractories	3.47	1.38
95	Lime	2.55	0.92
96	Gypsum Bldg. Mtls.	2.36	1.21
97	Mineral Wool	2.42	1.60
98	Pig Iron	2.67	1.76
99	Semi-Fin. Steel	0.70	0.48
100	Mfd. Iron or Steel	0.83	0.54
101	Iron or Steel Pipe	1.28	0.40
102	Ry. Track Mtl.	2.33	2.07
103	Ferroalloys	2.43	1.14

SPC	Description	Mean Score	St. Dev.
104	Prim. Copper Prod.	1.39	0.66
105	Prim. Zinc Prod.	2.80	0.20
106	Prim Alum. Prod.	1.65	0.86
107	Copper Shapes	1.82	0.69
108	Alum Shapes	1.34	0.43
109	Metal Containers	1.92	0.89
110	Farm Machinery	1.04	0.48
111	Heavy Machinery	1.32	0.69
112	Maj. Hsehld. Appliances	1.34	1.03
113	Household Appliances	1.10	0.53
114	Automobiles	1.40	0.42
115	Other Motor Vehicles	0.22	0.88
116	Motor Vehicle Parts	0.54	0.71
117	Loco. or Car Parts	1.55	0.61
118	Ferrous Scrap	0.60	0.38
119	Non-Ferrous Scrap	1.86	1.28
120	Textile Waste	3.83	1.31
121	Paper Waste	2.67	1.65
122	Chemical Waste	2.13	0.91
123	Empty Containers	2.93	1.62
124	Frt. Forwarder Traf.	2.52	1.57

SPC	Description	Mean Score	St. Dev.
125	Ship. Assn Traf.	2.50	2.29
126	Misc. Mixed	2.25	1.69
127	All Other	2.15	1.47
All Rail Traffic		2.02	1.10

Source: A. T. Kearney Analysis of Specially Edited 1977 One Percent Waybill Sample.

SUMMARY STATISTICS MATRIX

ggregate tandard eviation		Aggregate Mean of the Scores 0	1	2	3	4	5	Total
0.00 to 0.24	Cells	140	521	367	351		576	1,955
	Carloads	810	2,151	10,064	573		1,368	14,966
	Tons	44,749	138,424	843,479	32,157		84,168	1,142,977
0.25 to 0.74	Cells	351	142	128	2	6		629
	Carloads	15,991	7,594	28,039	22	132		51,778
	Tons	685,611	541,218	2,302,975	1,717	5,672		3,537,193
0.75 to 0.99	Cells	85	222	127	7	16		457
	Carloads	3,111	7,295	5,829	78	172		16,485
	Tons	150,171	381,821	144,788	4,498	9,808		691,086
1.00 to 1.24	Cells	43	340	323	32	75		813
	Carloads	2,363	10,704	12,859	404	921		27,251
	Tons	122,795	569,175	926,333	20,756	49,726		1,688,785
1.25 to 1.49	Cells	8	99	323	125	97		652
	Carloads	131	3,600	9,584	5,505	1,731		20,551
	Tons	7,433	160,847	574,601	308,561	113,970		1,165,512
1.50 to 1.74	Cells		42	143	401	44		630
	Carloads		830	4,196	9,742	338		15,106
	Tons		50,235	185,573	542,413	19,530		797,751
1.75 to 1.99	Cells		12	37	42	2		93
	Carloads		175	587	540	13		1,315
	Tons		7,814	23,340	23,184	401		54,739
2.00 to 2.49	Cells		15	33	56	5		109
	Carloads		60	165	234	20		479
	Tons		3,289	7,412	13,454	970		25,125
2.50 to 2.99	Cells			3	18			21
	Carloads			13	36			49
	Tons			399	1,752			2,151
3.00 to 3.49	Cells							
	Carloads							
	Tons							
3.50 up	Cells			3				3
	Carloads			6				6
	Tons			402				402
Total	Cells	627	1,396	1,487	1,034	245	576	5,365
Total	Carloads	22,406	37,409	71,342	17,134	3,327	1,368	147,986
Total	Tons	1,010,759	1,852,823	5,309,302	948,587	200,077	84,168	9,405,716

EXHIBIT V-23

SUMMARY FOR ALL STC COMMODITIES, ONLY COMPETITIVE TRAFFIC

Summary for all S.T.C. Commodity Codes
Cases Selected If Mean Score Plus Twice the Standard Deviation < 3.01

•

Number of Carloads:	45,810
Number of Cells:	713
Number of Records:	44,493

Units of analysis: Carloads

1.23	Mean of the Scores.
2	Mode of the Scores.
0.31	Standard deviation of the Scores.
93	Number of Unstable Demand Carloads.
0.2%	Percent of Unstable Demand Carloads.
14,486	Number of Non-compensatory Carloads.
31.6%	Percent of Non-compensatory Carloads.
10.0%	Percent Carloads with stable or increasing market share.
42.2%	Percent Carloads passing REVENUE/VARIABLE Cost > 1.4.
20.6%	Percent Carloads passing REVENUE/VARIABLE Cost > 1.8.
2.5%	Percent Carloads with stable demand.

	Passing No Items	1 Item	2 Items	3 Items	4 Items	5 Items
Number of Carloads	12,064	12,376	20,238	964	0	218
Number of Cells:	471	210	32	0	0	0

	Item 1	Item 2	Item 3	Item 4	Item 5
Number of Carloads:	20,425	22,359	4,600	243	1,157

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EXHIBIT V-24

SUMMARY STATISTICS MATRIX, ONLY FOR COMPETITIVE TRAFFIC

Aggregate Standard Deviation		Aggregate Mean of the Scores: 0	1	2	3	4	5	Total
0.00 to 0.24	Cells	8	10	8				26
	Carloads	331	490	5,861				6,872
	Tons	19,730	49,914	514,182				583,826
0.25 to 0.74	Cells	351	131	24				506
	Carloads	15,991	6,710	9,417				32,118
	Tons	685,611	486,973	763,231				1,935,815
0.75 to 0.99	Cells	45	63					148
	Carloads	3,111	2,353					5,464
	Tons	150,171	114,387					264,558
1.00 to 1.24	Cells	27	6					33
	Carloads	1,312	44					1,356
	Tons	41,831	1,766					43,597
1.25 to 1.49	Cells							
	Carloads							
	Tons							
1.50 to 1.74	Cells							
	Carloads							
	Tons							
1.75 to 1.99	Cells							
	Carloads							
	Tons							
2.00 to 2.49	Cells							
	Carloads							
	Tons							
2.50 to 2.99	Cells							
	Carloads							
	Tons							
3.00 to 3.49	Cells							
	Carloads							
	Tons							
3.50 up	Cells							
	Carloads							
	Tons							
Total	Cells	171	210	32				713
Total	Carloads	20,745	9,787	15,278				45,810
Total	Tons	897,343	653,040	1,277,413				2,827,796

EXHIBIT V-25

VI - ASSESSMENT OF RAILROAD MARKET POSITION FOR SELECTED COMMODITIES

As noted in Chapter II, the three key public interest objectives for transportation regulation are:

- Protection of shippers from abuse of market power.
- Economically rational and efficient allocation of transportation resources.
- Adequate revenue for transportation companies.

The purpose of this chapter is to address the first of these objectives in a qualitative and judgmental manner. Specifically, the chapter contains a discussion by selected commodity and product groupings of the potential for shipper abuse. This discussion serves as an independent cross check on the empirical approach outlined and presented in Chapters IV and V of this report.

The potential for shipper abuse is considered to be present if a shipper has no other transportation alternative to rail and lacks other negotiating strength in dealing with rail carriers. The assessment of shipper abuse is based on an analysis of descriptive industry data that are available in published reports and shipper interviews conducted by Kearney. Individually, in-depth interviews were conducted with key transportation decision makers of selected industries that use rail transportation. Although the questions were tailored to the transportation characteristics of each industry, the general topics that were discussed included:

- Background information on the overall importance of rail to the company's total transportation needs.
- Characteristics of the company's rail traffic, such as number and location of origins, number and location of destinations, annual volume, and typical shipment size.
- Transportation alternatives available to the company by selected origin and destination pair.

- Transportation practices and policies of the company that might indicate some form of shipper bargaining power with carriers.

- Personal judgment by the interviewee of the impact of deregulation on their company and industry.

An initial set of four major rail commodities were selected for study. These commodities were grains, coal, ores, and forest products. However, on the basis of traffic characteristics, such as linked movements of raw materials and finished products, the initial set was expanded to include the following groupings:

Grains and oilseeds
Grain milling and oilseed processing products
Meat and meat by-products
Canned fruits and vegetables
Sugar
Coal
Iron ore
Steel products
Iron and steel scrap
Cement, sand, and aggregates
Lumber and plywood
Pulpwood logs and chips

The discussions that follow beginning with grains and oilseeds, are each divided into the following subheadings:

Background
Rail traffic flows
Transportation alternatives
Shipper bargaining power
Summary

A - GRAINS AND OILSEEDS

Grain includes major field crops, such as corn, grain sorghum, wheat, and barley as well as other field crops, such as rice, rye, and oats. Oilseeds include soybeans, sunflower seeds, and flaxseeds.

Grain and oilseed shipments represent a significant percentage of rail traffic. In 1977, carloadings of grain and oilseeds for Class I Railroads accounted for over five percent of total carloadings. This section of the report will discuss wheat, corn, sorghum, and soybeans. Processed and milled products of these commodities, such as wheat flour, corn oil, soybean oil and meal will be discussed in a separate section of this chapter.

BACKGROUND

Wheat, corn, sorghum and soybeans when properly dried and ventilated can be stored for indefinite periods of time without damage. These commodities lend themselves to bulk handling methods. The production and consumption of each commodity is as follows:

1. Wheat. Exhibit VI-1 lists the ten major wheat producing states. Hard winter wheat is grown in the Southwest (Oklahoma, Texas, and Colorado) and the Midwest (Kansas and Nebraska). Wheat production in these states accounted for 39% of the average U.S. production from 1973 to 1977. Spring and durum wheat are produced in such states as North Dakota, Montana, and Minnesota. These states accounted for 25% of average U.S. production. White wheat is grown principally in the Northwest and soft wheat is grown in midwestern states such as Illinois.

Table VI-1, on the following page, illustrates the consumption of these crops in 1977. Export shipments of wheat represented 57% of total disappearance. Another 29% of wheat disappearance was attributable to domestic milling of wheat into flour.

2. Corn. Exhibit VI-2 lists the top 10 corn producing states for 1973 to 1977 average production. Midwestern states including Iowa, Illinois, Wisconsin, Indiana, and Nebraska accounted for 74% of U.S. average corn production.

TABLE IV-1

1977 U.S. CROP USE
(Bushels in Millions)

Use	Wheat Bu	Wheat (%)	Corn Bu	Corn (%)	Sorghum Bu	Sorghum (%)	Soybeans Bu	Soybeans (
Domestic Food	569	(29)	550	(9)				
Domestic Feed	193	(10)	3,750	(61)	450	(66)		
On Farm			2,122[1]	(35)				
Off Farm			1,628[1]	(26)				
Oil and Meal							935	(5
Other Domestic	80	(4)			6	(1)	59	(
Export	1,124	(57)	1,850	(30)	225	(33)	700	(4
Total	1,966	(100%)	6,150	(100%)	681	(100%)	1,694	(10

[1]Estimated from statistic on total commercial sales for 1977 crop year.

Source: USDA Agricultural Statistics 1978.
USDA Situation Reports, WS-245, FDS-270, FDS-292

The predominant use of corn during the 1977 crop year, estimated to be 61% of total disappearance (see Table VI-1), was feed for livestock. Since much of this corn is consumed on the farm, it is not available for rail transportation to commercial markets. During the 1977 crop year on-farm use of corn for feed was 35% of total disappearance.

Export shipments of corn represented 30% of total corn use with another 9% being used by corn processors and seed producers.

3. Sorghum. Exhibit VI-3 lists the top 10 sorgbum producing states. Texas, Kansas, and Nebraska accounted for 82% of the U.S. average crop production.

The disappearance of sorghum during the 1977 crop year was comparable to corn (see Table VI-1); the only exception is that sorghum is not processed in the U.S. as food.

4. Soybeans. Exhibit VI-4 lists the top 10 soybean producing states. Soybean production is concentrated in the Midwest (Illinois, Iowa, and Indiana), Southwest (Arkansas and Louisiana), and Southeast (Mississippi and Tennessee).

Approximately 55% of the soybean disappearance in crop year 1977 was accounted by domestic processing (or crushing) into liquid oil and meal, a high protein feed for livestock. Export shipments of soybeans accounted for another 41% of total disappearance.

RAIL TRAFFIC FLOWS

Rail origins for the shipment of wheat, corn, sorghum and soybeans are typically grain handling elevators located in the principal crop producing areas of the U.S. These areas include the Midwest, Southwest, Southeast, and Northwest.

The most obvious distinction between rail destinations for grain and oilseeds is domestic and export. Domestic destinations include milling and processing operations as well as livestock feeding operations. As mentioned earlier, domestic milling and processing operations will be discussed under a separate section of this chapter. Livestock feeding of corn, sorghum, and occasionally wheat includes broiler, egg, and other poultry operations; beef cattle operations; dairy cattle operations, and hog operations.

Since broiler production and a significant share of beef cattle production are concentrated in areas outside the midwestern corn belt states, these livestock operations represent primary rail destinations. Exhibit VI-5 lists the top 10 broiler producing states, accounting for 83% of total U.S. production in 1977. Broiler production is concentrated in the Southwest, Southeast, and the Middle Atlantic states. Exhibit VI-6 lists the states having the largest number of cattle on feed as of January 1978. The important cattle producing states for rail delivery of feed grains are located in the Southwest and West. Midwestern cattle operations, on the other hand, typically are located on farms or receive their feed grains by truck from nearby farms and elevators.

Dairy cattle and pig operations are located primarily in the Midwest. The only exceptions to these statements are the dairy operations in the Northeast and California and the pig operations in North Carolina. Exhibit VI-7 lists the 10 states with the largest number of milk cows as of 1977 and Exhibit VI-8 lists the 10 states with the largest pig crop in 1977.

In summary, the locations of domestic livestock feeding operations that represent primary rail destinations are the:

- Southwest.
- Southeast and Middle Atlantic states.
- West.
- Northeast.

Export destinations for rail shipments of grains and oilseeds are terminal elevators that have the capability of loading deep draft vessels. These export elevators can be grouped into at least seven areas, based on geographic location, delivery railroads, type of rail rates in effect at the present time, and mix of rail, barge, and truck receipts. These areas are the:

- New Orleans area.
- Texas gulf (Beaumont to Brownsville).
- South Atlantic and East gulf (Savannah, Georgia to Mobile, Alabama).

- North Atlantic (Norfolk, Virginia to Philadelphia, Pennsylvania).
- Pacific Northwest (Portland, Oregon to Seattle, Washington).
- California (Sacramento to Long Beach).
- Great Lakes (Duluth, Minnesota to Buffalo, New York).

The principal origin and destination pairs for the rail movement of wheat, corn, sorghum and soybeans are noted in Table VI-2 on the following page.

Another aspect of grain traffic flows is the variability of demand for rail transportation. Some indication of this variability is provided by Table VI-3. For the period 1970 to 1975, wheat and corn shipments fluctuated up and down, reaching a peak in 1973 when heavy export shipments were being made to the Soviet Union. The demand for rail traffic is also affected by changes in U.S. regional crop production. For example, the prolonged dry spell in the Southeast during the summer months of 1977 reduced local supplies of corn and forced broiler producers to seek corn from origins further north and west than their usual sources of supply. This uncertainty of demand facing the rail carriers makes it difficult to set rates that will adequately compensate the carriers under all circumstances and, as a result, it is an argument for some form of private negotiation such as contract rates since it may not be possible to assure equity to both shipper and carrier through a regulatory framework.

TRANSPORTATION ALTERNATIVES

Since the analysis of shipper and receiver interviews indicated that transportation alternatives differed by origin and destination pair, it is necessary to discuss these alternatives for each of the destinations noted in Table VI-2 on the following page. As a general comment, grain receivers and shippers have grain handling facilities with some storage capacity. As a result, direct transportation cost along with equipment availability, not service considerations, are the major factors influencing choice of mode.

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TABLE VI-2

Principal Origin and Destination Pairs for Rail Movements of Wheat, Corn, Sorghum, and Soybeans

DESTINATIONS	ORIGINS: MIDWEST	SOUTHWEST	SOUTHEAST	NORTHWEST
EXPORT				
New Orleans	X			
Texas Gulf	X	X		
South Atlantic/ East Gulf	X		X	
North Atlantic	X			X
Pacific Northwest	X			X
California	X	X		
Great Lakes	X			
DOMESTIC LIMESTOCK FEEDING				
Southwest	X	X		
Southeast	X		X	
West	X	X		
Northeast	X			

Source: (1) A. T. Kearney interviews with grain shippers; (2) USDA Agricultural Statistics 1978 and (3) One Percent Waybill Sample of 1977 Rail Traffic.

1. Export Elevators in the New Orleans Area. Export elevators in the New Orleans area receive corn, soybeans, and wheat by barge and rail from local and terminal elevators that are located in the Midwest. A practical alternative for a portion of this rail traffic is increased truck shipments from local elevators to barge-loading terminals on the Mississipi River and its tributaries. Limiting factors to the increased use of barge transportation are the length of haul from the local elevator to a river terminal and the three month period of closed navigation on the Upper Mississippi and Missouri Rivers. (Navigation has also been restricted on the Illinois River during the past three years.)

2. Export Elevators on the Texas Gulf. Export elevators on the Texas gulf receive wheat and sorghum by rail and truck from local and terminal elevators in the Southwest. In addition, these export elevators receive wheat, corn, sorghum, and soybeans by rail from the Midwest. Increased truck shipments represent an alternative to a portion of the rail traffic from the Southwest. At the present time, grain is shipped by truck to the Texas gulf ports from origins as far north as Southern Kansas. However, there are limitations to the use of trucks that would effectively restrict most Midwest origins to rail shipments. These limitations are: first, the cost advantage enjoyed by rail carriers as compared with motor carriers due to length of haul and shipment size and, second, the lack of sufficient motor carrier equipment.

TABLE VI-3

Shipments of Wheat, Corn,
Sorghum, and Soybeans by Rail[1]
(Millions of Tons)

	Wheat	Corn	Sorghum	Soybeans	Total
1970	49.5	48.7	14.2	18.3	130.7
1971	44.5	43.0	16.4	16.3	120.2
1972	57.7	49.1	12.3	13.9	133.0
1973	76.6	73.1	14.2	16.2	180.1
1974	60.2	66.0	15.0	17.2	158.4
1975	62.7	55.6	12.4	12.5	143.2

[1]Rail tonnage is for Class I Railroad.

Source: ICC Freight Commodity Statistics.

3. Export Elevators on the South Atlantic and East Gulf. Export elevators on the South Atlantic and East gulf receive soybeans by truck and rail from local terminals in the Southeast. However, they also rely on rail shipments of corn and soybeans from midwestern origins. While increased use of trucks is a practical alternative for southeastern origins, it is not for midwestern origins.

4. Export Elevators on the North Atlantic. Export elevators on the North Atlantic receive corn, soybeans, and wheat by rail from the Midwest. There are no practical alternatives to the use of rail, because of the cost advantages enjoyed by rail carriers as a result of length of haul and unit train service.

5. Export Elevators in the Pacific Northwest. Export elevators in the Pacific Northwest receive wheat by barge, rail and truck from origins in the Northwest. In addition, these elevators receive wheat, corn, and sorghum by rail from midwestern origins. A practical alternative to a portion of rail traffic originating in the Northwest is increased truck shipments to barge-loading stations on the Columbia-Snake Rivers. At the present time, grain is being transported by truck as much as 100 miles from local elevators to barge-loading terminals. However, there is no practical alternative to the use of rail for shipments from the Midwest, because of rail carriers' cost advantage due to the long haul.

6. Export Elevators in California. Export elevators in California receive corn and sorghum by rail from local and terminal elevators in the Southwest (principally Texas) and Midwest. There are no practical alternatives to rail shipment.

7. Export Elevators on the Great Lakes. Terminals on the Great Lakes receive corn, soybeans, and wheat by truck and rail from local elevators in the Midwest. Truck shipments represent an alternative for a portion of this traffic. The length of haul from local elevators to the nearest Great Lakes terminal is the principal factor limiting the use of trucks.

8. Domestic Feeders in the Southwest. Domestic feeders in the Southwest receive corn and sorghum by rail and truck from local and terminal elevators in the Midwest. Truck shipments represent a practical alternative for a protion of this rail traffic, but, at the present time, shippers indicate that transportation by truck has been competitive with rail only for distances of 200 miles or less. Another alternative is the receipt of feed grains by barge at poultry feeding operations located on or near the Arkansas River. Although broiler producers have rarely used barge transportation in the past, this alternative does represent potential competition to rail.

9. Domestic Feeders in the Southeast and Middle Atlantic States. Domestic feeders in these areas receive corn by rail and barge from Midwest origins. As in the case of domestic feeders in the Southwest, truck and combination truck and barge shipments represent alternatives for a portion of this rail traffic. Feed operations located on the Tennessee River, for example, have received corn by barge in the past. However, limitations, such as the high comparative cost of transporting corn over 200 miles by truck and the location of some feeding operations well away from inland waterways, restrict some operations to the use of rail.

10. Domestic Feeders in the West. Western feeders receive corn and sorghum by rail from local and terminal elevators in the Midwest and Southwest. There are no practical alternatives to rail, as a result of the cost advantages of rail shipment due to the long haul and widespread use of multiple car shipments.

11. Domestic Feeders in the Northeast. Domestic feeders in the Northeast receive corn by rail from midwestern origins. Truck shipments represent an alternative for only a portion of this traffic. The major limiting factor is, once again, the higher cost of trucking associated with the length of haul.

Tables VI-4, on the following page, summarizes the availability of transportation alternatives to rail shippers and receivers by traffic flow. There is no effective competition to rail from midwestern origins to five export and one domestic destination. In addition, there is no effective competition from southwestern origins to West Coast destination.

Having identified those origins and destinations that do not have transportation alternatives, it is appropriate to discuss whether shippers and receivers in these areas appear to have sufficient bargaining power to prevent the railroads rate-making abuses.

SHIPPER BARGAINING POWER

(a) Shippers

Grain and oilseed shippers vary by annual volume shipped, type and number of elevator facilities operated, and amount of capital employed. Shippers also vary by the number of markets to which they can typically ship and origins from which they can typically draw.

TABLE VI-4

Transportation Alternatives
for a Portion of the Rail
Traffic Between Each O/D Pair

DESTINATIONS	ORIGINS			
	MIDWEST	SOUTHWEST	SOUTHEAST	NORTHWEST
EXPORT				
New Orleans	T/B			
Texas Gulf	None	T		
South Atlantic/ East Gulf	None		T	
North Atlantic	None			
Pacific Northwest	None			T/B
California	None	None		
Great Lakes	T			
DOMESTIC LIMESTOCK FEEDING				
Southwest	T and B	T		
Southeast	T and B		T	
West None	None			
Northeast	T			

Notes: "T/B" denotes combination truck and barge shipment.

"None" denotes that there is no effective competition.

"T" denotes truck shipment.

"T and B" denotes truck shipments and combination truck and barge shipments.

Source: A. T. Kearney shipper interviews.

In general, shippers can be divided into at least two groups: local elevator operators and terminal elevator operators. Local elevators are general purpose facilities that are designed to offer a range of services, such as grain drying, storage and shipping, for farmers in the immediate vacinity. In contrast, terminal elevators are designed for specific purposes, such as transit storage and blending of wheat or high volume shipment of grain by unit train, and typically are located at points that serve more than one market and draw from more than one localized origin.

Local elevator operators suggest several reasons why they have little shipper bargaining power with carriers. First, their facilities almost always have access to only one railroad. Second, their facilities may only serve one market and, third, their facilities often have only one source of grain. All three reasons suggest that in fact local elevator operators will have little shipper power. However, for several reasons, a rail carrier's ability to take advantage of such local elevator operators is also limited. First, operators of local elevators that have such restrictions are typically unwilling to make additional investment in fixed plant. Recognizing that their competitive advantage as a facility operator may have changed, some local elevator operators have reinvested earnings in transportation equipment, such as tractor-trailers. They operate their own trucks in order to deliver grain to nearby terminal elevators that are better designed or more favorably located. In summary, local elevator operators in the Midwest and Southwest and rail carriers each appear to have bargaining power elements, particularly with long run.

Terminal elevator operators indicate that they do have some form of shipper bargaining power. Their facilities are typically served by more than one carrier and, as mentioned above, are located to serve more than one market and draw from more than one localized origin. But, most important of all, midwestern and southwestern terminal elevator operators consider their long haul shipments to be attractive business for which railroads may wish to compete.

(b) Receivers

Receivers of grain and oilseeds can be divided into at least three groups: export elevator operators, domestic users of feed grains, and domestic millers and processors. As noted earlier, millers and processors will be discussed under another section of this chapter.

Export elevator operators have some shipper bargaining power. Export terminals are typically served by more than one railroad. Rail shipment of grains for export in many cases represents attractive business to rail carriers, because it is high volume, long haul, and appropriate for use of unit trains. Finally, some grain exporting companies operate more than one export terminal and, in response to a sharp increase in rail rates applicable at one port, these companies can shift some business from that port to another.

Beef cattle and poultry producers in the West indicate that they have little shipper bargaining power, because first, they have made substantial investment in fixed plants that are typically not located on more than one railroad and, second, they must sell their products in a competitive market and, as a result, are unable to pass rail rate increases on to consumers unless these increases apply to other producers selling in the same markets.

SUMMARY

An analysis of transportation alternatives for rail shipment of grains and oilseeds indicates that practical alternatives exist for some shippers in the Midwest, Southwest, Southeast, and Northwest for shipment to selected export and domestic destinations. The specific traffic flows with practical alternatives for a portion of the rail traffic are:

1.	Midwest	Export elevators at New Orleans
2.	Southwest	Export elevators on Texas Gulf
3.	Southeast	Export elevators on South Atlantic and East Gulf
4.	Northwest	Export elevators in Pacific Northwest
5.	Midwest	Export elevators on Greak Lakes
6.	Midwest	Livestock producers in the Southwest
7.	Southwest	Livestock producers in the Southwest
8.	Midwest	Livestock producers in the Southeast
9.	Southeast	Livestock producers in the Southeast
10.	Midwest	Livestock producers in the Northeast

Since transportation alternatives exist for a portion of the above rail traffic, some form of reduced rate regulation may be appropriate. However, it should be noted that, in specific instances, there are limiting factors, such as length of haul and distance from inland waterways, that restrict the use of another mode. As a result, complete deregulation of rates may not be appropriate in all cases.

The same analysis of transportation alternatives indicates that practical alternatives do not exist for most shippers in the Midwest and Southwest for shipment to selected export and domestic markets. The specific traffic flows with no practical alternatives are:

1.	Midwest	Export elevators on Texas Gulf
2.	Midwest	Export elevators on South Atlantic and East Gulf
3.	Midwest	Export elevators on North Atlantic
4.	Midwest	Export elevators in Pacific Northwest
5.	Midwest	Export elevators in California
6.	Southwest	Export elevators in California
7.	Midwest	Livestock producers in the West
8.	Southwest	Livestock producers in the West

Since transportation alternatives do not exist for the above rail traffic, some form of continued rate regulation may be appropriate, provided, first, adequate revenue can be assured rail carriers and, second, shippers have little bargaining power with carriers.

The analysis of shipper bargaining power indicates that domestic livestock producers in the West have little shipper bargaining power. Since they have no practical transportation alternatives and little shipper bargaining power, some form of rate regulation governing traffic flows #7 and #8 listed above may be desirable.

The analysis of shipper bargaining power does not lead to a clear-cut answer with respect to some export shipments from local elevator operators in the Midwest and Southwest. Although export elevator operators do have some form of shipper bargaining power, many local elevator operators do not. As a result, some form of rate regulation may be appropriate for traffic flows #1 through #6 listed above.

B - GRAIN MILLING AND OILSEED PROCESSING PRODUCTS

This section contains a discussion of the potential for shipper abuse in selected grain milling and oilseed processing industries. The specific industries that will be addressed are:

- Wheat flour milling.
- Wet corn milling.
- Rice milling.
- Soybean processing.

BACKGROUND

The commodity characteristics of wheat flour, wet corn milling products, milled rice, and soybean oil and meal are discussed below.

1. Wheat flour. Although other grains, such as rye, buckwheat, and oats, are milled into flour, wheat is the principal grain milled in the U.S. As indicated in Table VI-1 (see page VI-4), 569 million bushels, representing 29% of total wheat disappearance, were milled during the 1977 crop year. A bushel (60 lbs.) of wheat produces approximately 46 or 47 lbs. of milled flour. The other by-products of wheat milling include feedstuffs, such as midlings and shorts.

Flour must be kept clean and dry and, as a result, must be transported in a contamination-free manner. Bulk flour is transported in specially designed covered hoppers that have lined interiors and pneumatic discharge outlets. Bagged flour must be shipped in contamination-free boxcars.

2. Wet corn milling products. Corn is milled by both a dry and wet milling process. As can be seen from the data in Exhibit VI-9, the principal growth over the past 10 years in the use of corn for food has been wet corn milling products and this discussion is limited to these products. A bushel (56 lbs.) of corn milled by a wet corn process will typically produce 1 1/2 lbs. of oil; 2 1/2 lbs. of 60% protein gluten meal (feedstuff); 12 1/2 lbs. of 21% protein gluten feed (another feedstuff); and 31 lbs. of starch on a dry basis. The starch can in turn be converted into sugars. Since the oil and sugars are used as food, their shipment by rail must be by a contamination-free method.

3. Milled rice. Exhibit VI-10 lists the six states that produce rice. Three states in the Southwest and California accounted for 94% of U.S. average crop production for crop years 1975 to 1977.

Table VI-5, below, indicates the disappearance of rice during the 1976 cropyear. Exports accounted for 61% of total use. Consumption for food and industry (including the brewing industry) accounted for another 37%.

TABLE VI-5

1976 U.S. CROP USE

Rough Rice and Milled Rice

Use	Million Cwt.	Percent of Total
Domestic Food	29.2	27%
Domestic Industry	10.3	10
Other Domestic	3.2	3
Export	65.6	61
Total	108.3	100%

Source: USDA Agricultural Statistics 1978.

4. Soybean oil and meal. As can be seen in Table VI-1 (see page VI-4), an estimated 935 million bushels, representing 55% of total soybean disappearance, were processed into oil and meal. Although there are other oilseeds that are processed in a similar fashion, soybeans are the principal oilseed processed in the U.S. The importance of soybean oil as a percentage of total U.S. production of fats and oils is indicated in Exhibit VI-11. A bushel (60 lbs.) of soybeans is crushed and produces approximately 11 lbs. of oil and 47 lbs. of high-protein meal (a feedstuff). Oil is transported in tankcars while meal is shipped by covered hopper car.

RAIL TRAFFIC FLOWS

The principal rail origins and destinations for each of the milling and processing industries will be discussed to identify the major traffic flows. As a general comment, millers and processors in deciding where to locate their plants take total transportation costs (total costs include inbound charges for delivery of grain or oilseeds and outbound charges for shipment of the processed products) into account. Typically, plants either are located in a major crop producing area and distribute processed products throughout the U.S. or are located away from major crop producing areas and distribute processed products in a regional area surrounding the plant.

Wheat milling plants are dispersed throughout the U.S. Some 37 states in the continental U.S. have active milling operations. Exhibit VI-12 lists the ten states with the greatest amount of active mill capacity. For purposes of discussing transportation alternatives available to flour mill operators, those mills that are inside major wheat producing areas will be distinguished from mills that are located outside major crop producing areas. A mill located in Kansas is an example of the former while a mill located in New York is an example of the latter. In either case, rail destinations for bulk flour include bakeries and food processing plants while rail destinations for packaged flour include wholesale and retail outlets.

Wet corn milling plants are located in eight states and, for the most part, these plants are concentrated in the cornbelt states (see Exhibit VI-13 for a listing of wet corn processing plants by state). However, as in the case of flour mills, those corn processing plants that are located in the cornbelt will be distinguished from other plants. Rail destinations for the processed products include food processing plants, feedmills, other industrial plants, and wholesale or retail outlets.

Rice milling plants are located in the rice growing states (see Exhibit VI-10 for a listing of these states). Domestic rail destinations include food processing plants, wholesale and retail outlets. Export destinations are transloading facilities located on the Gulf and West Coast.

Soybean processing plants are concentrated in three areas: the Midwest, Southwest, and Southeast (see Exhibit VI-14 for a partial listing of states with active soybean processing plants). Rail destinations for soybean oil include food processors, food processing plants, and wholesale and retail outlets. Rail destinations for meal include feedmills and export elevators located on the Gulf.

TRANSPORTATION ALTERNATIVES

The transportation alternatives available to plant operators for receipt and shipment of commodities by rail will be discussed under the following subheadings:

- Flour mills in wheat producing areas.
- Flour mills outside wheat producing areas.
- Corn milling plants in cornbelt.
- Corn milling plants outside cornbelt.
- Rice milling plants.
- Soybean processing plants in the Midwest.
- Soybean processing plants in the Southeast and Southwest.

1. Flour Mills in Wheat Producing Areas. Operators of these mills typically receive wheat by rail from grain elevators in the same region. Truck shipment is a practical alternative for this rail traffic. Length of haul is not likely to be a constraint since the distance between the mills and elevators is not typically large enough to provide rail carriers with a significant cost advantage.However, the widespread use of transit rail rates that tie the inbound shipment of wheat to the outbound shipment of flour does constrain the miller's choice of inbound mode.

Operators of these mills typically ship flour by rail. Truck is a practical alternative for only a portion of this rail traffic. The larger shipment size of bulk flour railcars and the cost advantages for long hauls of flour make rail transportation less costly than truck. Truck rates are typically higher than rail rates for distances beyond 300 to 500

miles. Analysis of the 1977 One Percent Waybill Sample indicates that there was some long-haul movement of flour by rail. Fully 36% of wheat flour milling products originating in the Western Trunk Line territory was shipped to destinations in the Official Territory. (See Exhibit VI-15 for unexpanded waybill sample tonnage for wheat flour milling products.)

2. Flour Mills Outside Wheat Producing Areas. Operators of these mills typically receive wheat by rail in multi-car or train shipments. Aside from operators of mills that are located on the Tennessee River and have a barge-receiving capability, mill operators do not have practical trans-portation alternatives to rail. Operators of these mills typically ship flour by rail and truck. Truck represents a practical alternative for much of this rail traffic, because the flour is typically distributed within the regional area surrounding the mill.

3. Corn Milling Plants in Cornbelt. Operators of these plants receive corn predominantly by truck and indicated that in recent years there has been a sharp decline in the use of rail. Truck shipment clearly represents a practical alternative to this rail traffic. However, these operators typically ship the processed products by rail and truck. Truck shipment represents a practical alternative for a portion of this rail traffic, but its use is limited by the length of haul from plant to customer. For long-haul shipments, truck transportation has not been competitive with rail. Analysis of the 1977 One Percent Waybill Sample indicates that there was some long-haul movement of product by rail; 26 and 22% of what corn mill products originating in the Western Trunk Line territory were shipped to destinations in the Transcontinental and Official territories, respectively (see Exhibit VI-16).

4. Corn Milling Plants Outside Cornbelt. Operators of these plants typically receive their corn by rail in multi-car or train shipments. Although truck transportation is an alternative for some of this rail traffic, its use is limited by the cost advantages of rail carriers for long-haul shipments and the limited availability of corn supplies within reasonable trucking distance of the plants.

Outbound shipments from these plants are typically made by truck.

5. Rice Milling Plants. Operators of these plants receive rice by truck and rail and indicated that in recent years there has been a decline in the use of rail. The decline is attributable largely to a shortage of railcars. Since these plants are located in rice producing areas, truck shipment is a practical alternative to rail.

Milled rice is distributed throughout the U.S. by truck and rail; and increased use of truck transportation is limited by length of haul and the availability of sufficient trucks to move the product. Milled rice is also shipped to export elevators, but, at least in the case of some Arkansas mills, a combination truck and barge shipment was the predominant shipment method.

6. Soybean Processing Plants in the Midwest. Operators of these plants typically receive soybeans by truck. Outbound shipments of oil and meal are moved predominantly by rail. Since oil and meal are shipped from these origins throughout the U.S., the use of trucks is limited by the length of haul from plant to customer and the availability of sufficient trucks to move large volumes. See Exhibit VI-17 for the distribution of these products across railroad territories as indicated by the One Percent Waybill Sample of 1977 railroad traffic.

7. Soybean Processing Plants in the Southeast and Southwest. Soybeans are typically received by rail at these plants. Beyond distances of 200 to 350 miles, the use of trucks has not been competitive with rail. As a result, truck transportation is a practical alternative for only a portion of this rail traffic. Operators of these plants use rail and truck to make product deliveries. The availability of sufficient trucks and the length of haul were once again cited as limiting factors for the increased use of truck transportation.

The presence or absence of transportation alternatives for all millers and processors is summarized in Table VI-6, on the following page. Truck transportation is a practical alternative to rail in most instances, but its use is restricted by the length of haul and availability of sufficient trucks to move large shipments.

TABLE IV-6

Transportation Alternatives to Rail for Millers and Processors

		Inbound	Outbound
1.	Flour mills in wheat producing areas	T	T
2.	Flour mills outside wheat producing areas	None	T
3.	Corn milling plants in cornbelt	T	T
4.	Corn milling plants outside cornbelt	None	T
5.	Rice milling plants	T	T
6.	Soybean processing plants in the Midwest	T	T
7.	Soybean processing plants in the Southeast and Southwest	T	T

"T" denotes that truck transportation is a practical alternative for at least a portion of this rail traffic.

Source:
(1) Shipper interviews conducted by A. T. Kearney.
(2) Analysis of One Percent Waybill Sample of All U.S. Rail Traffic.

SHIPPER BARGAINING POWER

Having identified those inbound and outbound rail traffic flows that have no practical transportation alternatives, it is necessary to determine whether millers and processors have sufficient bargaining power to prevent rail carriers from taking advantage of them.

Millers and processors indicate that they do have some form of bargaining power. First, the majority of plants are served by more than one carrier. As a result, plant operators do have some control over routing. Second, millers and processors often operate more than one plant and have some flexibility to adjust production levels in response to selective rate increases. Third, some millers and processors indicate that they can adjust product prices (within certain limits) in response to changes in transportation costs. (Soybean processors in the Southeast and Southwest indicate that they do not have such pricing flexibility, because they are only one of at least two sources of supply for their customers.) Finally, some millers and processors indicate that their inbound and/or outbound shipments are attractive business for rail carriers. It represents high volume, long haul movements and, as a result, they expect to be able to negotiate with rail carriers on a meaningful basis for both service and cost.

SUMMARY

An analysis of transportation alternatives for millers and processors indicates that truck transportation represents actual or potential competition for much of their inbound and outbound rail movements. There are some exceptions. Shippers believe that transportation alternatives do not exist for inbound receipts of flour millers and corn processors whose plants are located outside major crop producing areas.

An analysis of shipper bargaining power indicates that millers and processors do have some form of bargaining power, and, as a result, the potential for shipper abuse does not appear substantial in these industries. Deregulation of rail traffic may be possible for these industries provided that there is a reasonable transition period.

C - MEAT AND MEAT BY-PRODUCTS

BACKGROUND

This commodity group can be separated into three distinct categories: fresh meat; processed meats; and meat by-products. Fresh meats are highly perishable and require specialized transportation equipment to maintain desired temperatures. Depending on the type of packaging, processed meats may not require refrigeration, but they have to be shipped in a contamination-free manner. Meat by-products, such as hides, tallow, grease, and lard, are transported in ordinary cars or trailers and tank equipment.

RAIL TRAFFIC FLOWS

Meat processing plants are located in those areas, such as the Midwest, Southwest and Southeast, where beef cattle, hog, and poultry production are concentrated. Analysis of the One Percent Waybill Sample for 1977 indicates that the principal rail movements of fresh meat were from origins in the Western Trunk Line territory to destinations in the Official Territory (see Exhibit VI-18). These movements represented 30% of all rail fresh meat shipments.

TRANSPORTATION ALTERNATIVES

Meat processors indicated that less than 10% of transportation expenditures are for rail and the majority of rail shipments involve the transport of meat by-products in tank cars. In all cases, processors indicated that rail shipment of fresh meats was no longer a significant percentage of total shipments. Truck transportation clearly represents a practical alternative to rail. Truck shipments also represent a practical alternative for the shipment of meat by-products, such as hides or lard.

SHIPPER BARGAINING POWER

Meat processors indicated that they did have some form of bargaining power with rail carriers insofar as they had routing control over rail shipments.

SUMMARY

Meat and meat by-products represent commodities where continued regulation of rail rates may not be justified on the grounds of shipper abuse. Truck transportation is a practical alternative to rail and shippers have some choice in how they choose to route their rail shipments.

D - CANNED FRUITS AND VEGETABLES

BACKGROUND

This commodity grouping includes canned fruits, vegetables, and juices. Fruit and vegetable processing plants typically are located in the major crop producing states, such as California, Oregon, Washington, Wisconsin, and Minnesota. For example, the U.S. INDUSTRIAL OUTLOOK FOR 1979 published by the U.S. Department of Commerce notes that California alone accounts for one-half of the total U.S. raw tonnage of processed vegetables. The in-bound movement of raw fruits and vegetables into these plants is highly seasonal, reaching a peak at the end of the harvest period.

The outbound shipment of the processed vegetable and fruit products, however, is spread throughout the crop year. Outbound shipments from these plants include both bulk shipments of products, such as vinegar and tomato paste, to food processing plants throughout the U.S. and shipments of canned goods to wholesale and retail outlets throughout the U.S. As a result of the seasonal imbalance of receipts and shipments, canners of fruits and vegetables typically must increase their inventory of processed products sharply at the beginning of the crop year and must maintain sufficient inventory to meet normal customer demand for the balance of the crop year.

RAIL TRAFFIC FLOWS

As mentioned above, fruit and vegetable processing plants typically are located in the major crop producing areas of the West (many fruits and vegetables), Midwest (vegetables such as green beans, peas, and sweet corn), and Southeast (fruits such as oranges). Canners indicated that raw vegetables and fruits are typically received by truck. Although there is some shipment of raw vegetables and fruits by rail (see Exhibit VI-19 for a summary of rail traffic flows for fresh vegetables and citrus fruits from the 1977 One Percent Waybill Sample), this traffic typically is destined to wholesale and retail outlets that market fresh produce rather than to food processing plants. Exhibit VI-20 provides a summary of rail traffic flows for outbound shipments of canned fruits and vegetables. These flows are summarized from the One Percent Waybill Sample of 1977 rail traffic. The major traffic flows originated from and were destined to the following rate territories:

- Southern to Official
- Official to Official
- Transcontinental to Western Trunk Line
- Transcontinental to Official

These four traffic lanes accounted for fifty percent of the 1977 canned fruits and vegetables rail tonnage.

TRANSPORTATION ALTERNATIVES

Inbound receipt of raw vegetables and fruits are made typically by truck. Since plants are located in the general vicinity of crop production areas, rail transportatin does not have any cost advantages associated with long-haul movements. Outbound shipments are divided between rail and truck. Rail transportation has been competitive for the high volume, long-haul movements of canned or bulk processed products. Inter-plant shipments are likely to be moved by rail because transit time is not a critical factor in the choice of mode for canners. However, most canners indicate that truck transportation is a practical alternative for the majority of rail traffic. Truck transporta- tion is limited in some instance by the length of haul for move- ments of bulk liquids, such as tomato paste and vinegar.

SHIPPER BARGAINING POWER

Canners of fruit and vegetables indicate that they do have some form of shipper bargaining power. First, some canners operate more than one plant and, in response to transportation cost increases, can adjust plant production at selected locations. Second, most canners have control of the routing of processed products and could direct traffic to a particular carrier. Third, the majority of canners indicate that they have some pricing flexibility. This flexibility allows them to pass at least a portion of higher transportation costs forward to their customers.

SUMMARY

An analysis of transportation alternatives for canners of fruits and vegetables indicates that truck transportation represents a practical alternative to most rail traffic.

Discussions with canners indicate that they do have some form of shipper bargaining power. Continued regulation of rail rates for canned fruit and vegetable traffic may not be justified on the basis of shipper abuse.

E - SUGAR

BACKGROUND

This section contains a discussion of sugar derived from sugarcane and sugarbeets. Sugar is also made from corn and, for a discussion of that product, see section B of this chapter.

Sugarcane and sugarbeets are dry bulk commodities that lend themselves to bulk handling methods. Sugar from both sources is shipped to final destinations in liquid or dry bulk containers, bags, and packages.

The majority of cane sugar originates overseas and is imported to the U.S. through a number of coastal cities. Refineries of sugarcane are often located near ports of entry, such as Boston, Baltimore, Chicago, and New Orleans. Sugarbeet production is concentrated in the West, Northwest, and Midwest. Exhibit VI-21 lists the top ten sugarbeet producing states for the 1976 crop year. These ten states accounted for 89% of total U.S. sugarbeet production. Sugarbeet refineries are located in areas of major production.

RAIL TRAFFIC FLOWS

Operators of refineries receive sugarcane predominantly by rail. Since these refineries are often located near ports of entry, the inbound movements are not long-hauls. Refiners of sugarbeets, on the other hand, typically receive the raw product by truck. The only significant rail movement of sugarbeets as indicated by the 1977 One Percent Waybill Sample was traffic originating and terminating in the Western Trunk Line territory.

Shipment of sugar from refineries is made by rail, barge, and truck. Bulk liquid or dry sugar is typically moved by rail or barge to food processors whereas packaged or bagged sugar is moved by rail and truck to wholesale and retail outlets. Rail shipments of refined sugar include movements contained within a rate territory (in 1977, these movements accounted for 54% of total traffic) and movements from one territory to another (in 1977, the largest single movement of this type was from the Transcontinental to the Western Trunk Line territories). Exhibit VI-22 summarizes rail traffic flows as indicated by the 1977 One Percent Waybill Sample.

Table VI - 7

Typical Coal Characteristics

Type	Typical Origin	Average Heat Value (BTU's per Pound)	Percentages of Weight				
			Moisture	Volatiles	Fixed Carbon	Ash	Sulfur
Anthracite	Pennsylvania	13,540	2.3%	3.1%	87.7%	6.9%	0.5%
Bituminous	Kentucky	12,950	7.2	39.8	48.8	4.2	2.6
Sub-Bituminous	Wyoming	9,420	23.3	33.3	39.7	3.8	.4
Lignite	North Dakota	7,210	34.8	28.2	30.8	6.2	.7

Source: J. H. Perry, *Chemical Engineers' Handbook*.

RAIL TRAFFIC FLOWS

In order to better understand the major traffic flows of coal, the origins and destinations for each type of coal will be discussed.

1. Anthracite. As noted above, production of anthracite coal is limited to northeastern Pennsylvania. Predominant destinations for this coal include Pennsylvania (points in this state account for over half of the annual consumption) and New York. In addition, there is some export demand through northeastern and Great Lakes ports. Truck shipments represent the predominant method of shipment followed by rail.

2. Bituminous. There are at least three major origins of bituminous coal:

- Appalachia.
- The Midwest.
- The West.

Appalachia includes such states as Kentucky, West Virginia, and Virginia. This coal is shipped by rail, barge, and truck. For example, in 1976 Kentucky coal mines shipped 103.0 million tons by rail and another 24.1 million tons by barge.[1] West Virginia coal mines shipped 85.0 million tons by rail and 11.5 million tons by barge in 1976.[2] The coal shipped by rail from these areas is typically destined for steam generating plants of electric utilities; coking mills of steel companies; and export terminals located on the North Atlantic and the Great Lakes. Barge shipments of coal are typically destined for electric utilities and steel companies, but little coal is moved for export by barge from these areas.

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1 U.S. Department of Energy Coal-Bituminous and Lignite in 1976.

2 Ibid.

Bituminous coal mined from the Midwest is also shipped by rail, barge, and truck. The principal midwestern states are Illinois, Ohio, and Indiana. In 1976, Illinois coal mines shipped 44.4 and 2.6 million tons by rail and barge, respectively.[1] Ohio coal mines during the same period shipped 19.0 and 7.9 million tons by rail and barge, respectively.[2] Although some rail coal from these areas will typically move for export, the primary destinations for rail coal are electric utilities and steel companies. Barge coal is also destined for electric utilities and steel companies.

Bituminous or sub-bituminous coal mined from states in the West, such as Wyoming and Montana, moves predominantly by rail and truck. For example, Wyoming coal mines moved 21.9 million tons of coal by rail in 1976; this represents 71% of total 1976 production.[3] The balance of this coal moved by truck or was consumed at the mine mouth. In contrast to the eastern mines, coal from these states is destined almost exclusively for steam generating plants of electric utilities. Coal from these states is especially attractive to electric utilities due to its low sulphur content.

As noted above, bituminous coal is shipped to three primary markets:

- Steam generating plants of electric utilities.
- Coking mills of steel companies.
- Export terminals.

An overview of the rail traffic flows from U.S. mines to electric utilities and export terminals can be obtained by analyzing the One Percent Waybill Sample for 1977 traffic. The principal traffic flows by originating and terminating rate territories is presented below:

- Official to Official (these movements account for 30% of all rail tonnage in 1977).
- Southern to Southern (29%).

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1 Ibid.

2 Ibid.

3 Ibid.

- Transcontinental to Western Trunk Line (15%).
- Southern to Official (6%).
- Western Trunk Line to Western Trunk Line (6%).

Exhibit VI-24 summarizes the rail traffic for steam bituminous coal for 1977 as indicated by the One Percent Waybill Sample.

Several points should be made with regard to these traffic flows. First, the two major traffic flows of steam coal, i.e., movements within the Official and Southern territories, comprise almost 60% of total steam coal traffic and represent shipments from Appalachian and Midwestern mines to both electric utilities and export terminals. Second, many of the rail movements within the Official and Southern territories represent short hauls of 250 miles or less. Third, total shipments from western mines are not nearly as large as those from eastern mines, but they do represent long-haul movements. For example, shipments from the Transcontinental to the Western Trunk Line territory represent movements from Wyoming and Montana to such destinations as Kansas City, St. Louis, San Antonio, and Minneapolis.

Bituminous coal is used in the production of coke as well. This coal is often referred to as coking or metallurgical coal in order to underscore its use to the steel industry. Steel industry personnel indicate that the coal used for coking purposes is typically a high value (in terms of carbon content), low-volatile bituminous coal. These same personnel indicate that much of the coking coal is produced at mines owned by steel companies. These mines are located in such states as:

- Pennsylvania.
- West Virginia.
- Northwestern Virginia
- Eastern Kentucky.
- Illinois.
- Utah.

The primary steel producing regions are the major coking coal destinations. These regions are:

- Pennsylvania (primarily Pittsburgh),
- Ohio,
- Northern Indiana and Illinois,
- Alabama (primarily Birmingham),
- Various locations in the west.[1]

The coking coal produced in the eastern mines typically moves into the Pittsburgh, Ohio, Northern Indiana, Northern Illinois, and Birmingham steel mills. Utah provides the coking coal for the mills in the West.

3. Lignite. Lignite is produced only in North Dakota and Texas. Because of its low heat value and relatively high mositure content, lignite is not shipped long distances. Instead, lignite is typically consumed at points near the actual mine mouth.

TRANSPORTATION ALTERNATIVES

The presence or absence of transportation alternatives available to coal shippers and receivers will be discussed for each of the following categories:

- Anthracite coal users.
- Bituminous coal mined in Appalachia for shipment to electric utilities and export terminals.
- Bituminous coal mined in the Midwest for shipment to electric utilities.
- Sub-bituminous coal mined in the West for shipment to electric utilities.
- Coking coal users.
- Lignite users.

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1 U.S. Department of the Interior 1974 Minerals Yearbook.

1. <u>Anthracite coal users</u>. Anthracite coal moves predominantly short distances by motor carrier. Truck transportation represents a practical alternative for a portion of this rail traffic for two reasons. First, the rail tonnage of anthracite coal does not represent large quantities (<u>The Minerals Yearbook, 1976</u> estimated rail tonnage to be less than 2 million tons) and it is reasonable to assume that there would be, with proper lead time, sufficient truck transportation to handle a portion of this traffic. Second, rail shipments of anthracite coal typically do not represent long-haul movements. As a result, the cost advantages of rail transportation associated with long-haul shipments do not apply to a portion of this rail traffic.

2. <u>Bituminous coal mined in Appalachia for shipment to electric utilities and export terminals</u>. Bituminous coal mined in Appalachia moves by rail, barge, and truck. For that portion of rail traffic that moves to electric utilities located near inland waterways, increased barge shipments represent a practical alternative. In addition, there may well be some rail traffic that can be diverted to truck. However, increased use of truck transportation is limited both by the quantity of rail traffic shipped from Appalachia (as noted above, Kentucky and West Virginia coal mines shipped over 190 millions tons of coal by rail in 1976) and the length of haul. For example, the major shipments of bituminous coal for export from Appalachia to North Atlantic ports including Norfolk have no effective competition. Present rail rates are below truck rates and reasonable increases in rail rates will not make truck transportation competitive.

3. <u>Bituminous coal mined in the Midwest for shipment to electric utilities</u>. As in the case of coal mined in Appalachia, increased used of barge and truck transportation are practical alternatives for only a portion of the rail shipment from midwestern mines. Clearly, electric utilities located near the Ohio, Illinois, or Mississippi Rivers could increase their receipt of barge delivered coal. And electric utilities located near coal fields could increase their receipt of truck delivered coal. But, the major limiting factors in each case are the high volume and moderate distances of midwestern-coal traffic.

4. Sub-bituminous coal mined in the West for shipment to electric utilities. These rail shipment represent long-haul movements. There is no effective competition from truck or barge competition. The Department of Energy estimates that less than 2% of all bituminous coal moved by slurry pipeline in 1976.[1]

5. Coking coal users. Transportation alternatives available to coking coal users differ by their geographical location. Steel mills in Pittsburgh can receive coking coal by barge or rail. Some mills in the Birmingham area can receive coal by water as well. But, steel mills at other locations have no effective competition to rail.

6. Lignite users. As mentioned earlier; most lignite is moved short distances by truck, conveyors or private railroad. As a result, the issue of alternatives to rail transportation is not as important for lignite as it is for the users of bituminous and sub-bituminous coal.

In summary, receivers of bituminous and sub-bituminous coal that moves by rail from eastern and western mines have little effective competition. In the East, use of barge transportation will be limited by the existing location of steam generating plants in relation to the inland waterways. In the East and West, use of truck transportation is limited by both the sheer volume of tonnage shipped and the length of haul. Coking coal users in some locations, such as the West, have no effective alternative to rail. The smaller volumes and shorter movements of anthracite and lignite coal traffic suggest that truck transportation is a practical alternative for part of this rail traffic.

SHIPPER BARGAINING POWER

Having determined that some electric utilities, steel companies, and export terminal operators have no effective alternative to rail, it is appropriate to discuss their relative shipper bargaining power with rail carriers.

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1 U.S. Department of Energy Coal-Bituminous and Lignite in 1976.

Electric utility operators typically have some form of shipper bargaining power. First, coal shipments to utility plants are generally attractive business for railroads. These shipments are attractive, because they represent high-volume, repetitive, point-to-point movements. Second, coal shipments are susceptible to annual volume rate negotiation. Many utilities have a good working relationship with the carrier or carriers that serve them. Many utilities have invested in private equipment and upgraded their receiving capability. Third, some electric utility operators have alternative sources of coal. Eastern utility operators have often made purchases from more than one mine and western coal is an alternative source of supply for some midwestern utilities that have relied on eastern coal. Utility operators that rely on western coal have more flexibility at the present time than they have had in the past as a result of the greater number of mines being opened in the West and the availability of spot coal. Although some utilities are served by one carrier only, there is a possibility that the delivery carrier could be shorthauled if combination rates can be successfully negotiated. Finally, some electric utilities have the ability to pass higher transportation costs forward.

Steel companies also have some form of bargaining power. First, some steel companies secure a portion of their coal requirements by operating their own private railroads. Second, steel companies have substantial inbound and outbound shipments that are attractive business for railroads. Third, some steel companies operate more than one plant and have some flexibility to adjust production levels in response to changes in rail rates. Fourth, many steel plants are served by more than one carrier and plant operators do have some control of routing.

Operators of export terminals also have some bargaining power. In some instances, these terminals are owned by a rail carrier. Other operators often have alternative sources of coal and are served by more than one carrier. Finally, these shipments, represent attractive business to railroads and, as a result, rate negotiation is possible.

SUMMARY

An analysis of transportation alternatives indicates that anthracite and lignite coal users have an effective transportation alternative in the use of trucks for a portion of their rail traffic. Bituminous and sub-bituminous coal users, however, may not have effective transportation alternatives. The use of barges is limited by the geographical location of existing steam generating plants and coking mills in relation to the inland waterways. The use of trucks is limited by the sheer volume and length of haul of present rail movements.

An analysis of shipper bargaining power indicates that the major users of coal, namely electric utilities, steel companies, and export terminal operators, typically have some form of shippers bargaining power. This bargaining power can be used to negotiate cost and service for the carriers. The continued regulation of rail rates for some coal shipments may not be justified on the basis of the potential for shipper abuse.

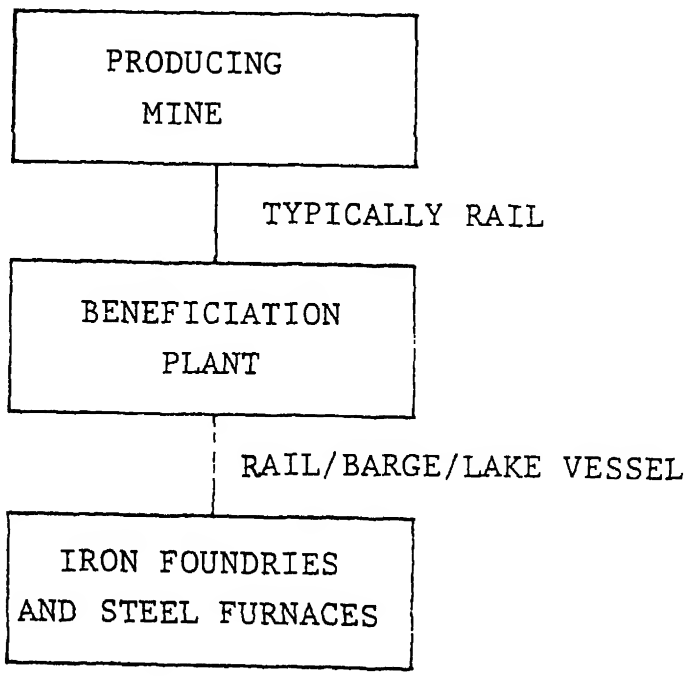
G - IRON ORE

BACKGROUND

Iron ore, coking coal, and limestone are the major raw materials used in steel production. Iron ore mining and transportation are closely linked to the major integrated steel companies. Steel companies have chosen plant locations that minimize the overall inbound and outbound transportation costs associated with the production and distribution of steel.

The flow of iron ore from mine to steel mill is summarized in Figure VI-1.

FIGURE IV - 1
FLOW OF IRON ORE
FROM MINE TO STEEL MILL



Source: Shipper interviews conducted by A. T. Kearney.

Crude iron ore is a powdery, rocky mixture with a high moisture content. The average iron content of crude ore produced in the U.S. is typically less than 50% by weight. (In 1975, the average iron content of U.S. crude iron ore, as indicated by the Department of Interior's Minerals Yearbook 1975, was 33%.) Because of these physical characteristics, crude iron ore is difficult to transport.

Beneficiation is a process to extract the iron from iron ore. This process makes it feasible to mine crude iron ore that has an iron content of as little as 20% by weight. After the crude iron ore has been processed, its average iron content is close to 100%. Since beneficiation plants are typically located near crude iron ore production mines, the process has greatly reduced the amount of tonnage that must be transported long distances. In 1975, over 90% of all crude iron ore produced in the U.S. was shipped first to beneficiation plants.[1]

Approximately, three fourths of all beneficiated iron ore is also pelletized to improve storage and loading qualities. Storage of iron ore is necessary for steel companies relying on Great Lakes transportation. These shipping lanes are closed during the winter months. The low value of iron ore makes storage a less costly option than shipment of the ore by another method during these months.

As indicated by the Department of Interior's Mineral Yearbook 1975, steel companies consumed 114 million long tons of iron ore in 1975. Of this total, 79 million long tons were produced in U.S. mines. The remaining iron ore requirements for U.S. steel companies were met by imports from such countries as Canada and Venezuela. U.S. iron ore production is concentrated in Minnesota (the Mesabi range accounted for 65% of total U.S. production in 1975) and Michigan (mines in Michigan accounted for 19% of 1975 production). Other U.S. production sources include such states as Wyoming, Missouri, and Utah.

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1 U.S. Department of Interior Minerals Yearbook 1975.

RAIL TRAFFIC FLOWS

From statistics in the Department on Interior's Minerals Yearbook, 1975, it is possible to determine the proportion of iron ore that travels by water or rail. Approximately 60% of the ore consumed in the U.S. travels at least part way by the Great Lakes from producing regions in Minnesota, Michigan, and Canada. Another 35% of iron ore consumed in the U.S. is imported from overseas locations. This ore may require a final rail or barge movement from port of entry to steel mill. The remaining 5% of iron ore consumption involves shipment to steel plants served almost completely by rail.

The mills of the integrated steel companies are concentrated along the southern shores of the Great Lakes and in areas such as Pittsburgh and Alabama. These mills are the major destinations of iron ore movements; smaller steel producers typically operate electric furnaces that require little iron ore. Exhibit VI-25 summarizes the rail traffic flows of iron ore for 1977. The overwhelming proportion of total tonnage is movements within the Official and Western Trunk line territories.

TRANSPORTATION ALTERNATIVES

Steel company personnel indicate that the majority of iron ore traffic moves by rail at one point or another from the mine to the steel mill. (Possible exceptions include steel mills that rely entirely on imported ore and are located at ports of entry.) For most of this rail traffic, the use of barge or truck transportation as an alternative is limited. Barge transportation is limited by the distance between the origin or destination and the inland waterways. Truck transportation is a practical alternative only for small shipments moving short distances such as a move from a Great Lake port facility to an inland steel mill located within 100 miles of the port.

SHIPPER BARGAINING POWER

Steel company personnel indicate that they do have some form of shipper bargaining power. For example, rate increases on iron ore shipments typically are not governed by general Ex Parte rate increases; instead, increases are based on long term escalation formulas that are negotiated between the steel company

and the carrier. These formulas tie rate increases to the actual rate costs incurred by the carrier. In addition, some of the large steel mill operators own Class II linehaul railroads. These lines have been built or acquired to move ore from the mine to the pellet plant to the port and, in some instances, from the vessel-receiving port to the steel mill. These railroads are in effect a part of the marine delivery network. Along the same lines, some steel companies own and operate switching railroads and, as a consequence, are a party to any increase in interline rail rates.

SUMMARY

An analysis of transportation alternatives available to steel companies indicates that truck and barge shipments are not likely to be effective competition for most of the iron traffic that moves by rail. Rail rates are presently below the direct costs of other alternatives and reasonable increases in rail rates are not likely to make other transportation methods practical.

An analysis of shipper bargaining power indicated that major steel companies representing the principal users of iron ore have some form of shipper bargaining power that is likely to prevent shipper abuse. Continued regulation of rail rates with respect to iron ore traffic may not be justified on the basis of the potential for shipper abuse.

H - SEMI-FINISHED AND BASIC STEEL PRODUCTS

BACKGROUND

This commodity grouping includes a number of diverse products. All the products originate from steel mills. An increasing amount of some of these products come from overseas mills. Selected products included in this grouping are pig iron, ingot, plates, shapes, sheet, strip, bars, rods, pipe, tubes, fittings, and tin mill products.

As a general comment, a dominant transportation characteristic of these commodities is that consumers, seeking to minimize inventory carrying costs, are ordering smaller quantities in greater frequency. Since the overwhelming majority of mill's customers are located within 500 miles of the mill area, long-haul movements of these commodities are not common.

RAIL TRAFFIC FLOWS

The location of some of the nation's major steel mills are: Chicago and Northwest Indiana; Pittsburgh; Cleveland; Detroit; Buffalo; Birmingham; Middletown, Ohio; Bethelehem; Philadelphia; and Youngstown, Ohio. Finished steel fabricators, the major users of steel products, are located all over the U.S., but, as noted above, traditionally fabricators have located their plants near mills.

Exhibit VI-26 provides a summary of rail traffic flows for semi-finished and basic steel products. The summary is based on the 1977 One Percent Waybill Sample. The complete dominance of traffic within the Official territory underscores the Great Lakes location of both most steel producers and many users, such as the automobile companies and their suppliers.

TRANSPORTATION ALTERNATIVES

The majority of steel products are shipped from mills to equipment manufacturers or distribution service centers. Steel mill operators indicate that they use both rail and truck and, on occasion, will use barge for high-volume, long-haul shipments.

Exhibit VI-27 indicates the distribution of steel product shipments by mode for 1967 and 1972. Both barge and rail carriers lost market share to motor carriers over this five year period. Barge shipments of plates, sheet, strip, and tin mill products declined as a percent of total ton-miles; rail shipments of pig iron, pipe, tubes, fittings, and tin mill products also declined. Steel mill operators indicate that the share of rail as a percent of total shipments has continued to decline in recent years. In some cases, piggyback transportation has replaced boxcar service. In every case, decisions are made daily concerning whether to ship specific products by rail or truck. Major reasons cited for increased use of trucks are first, truck rates are competitive with rail over increasingly longer hauls and, second, truck transportation is perceived by shippers and receivers as providing better service.

In summary, truck transportation is a practical alternative to rail for semi-finished and basic steel products.

SHIPPER BARGAINING POWER

Shippers of semi-finished and basic steel products who use rail appear to have shipper bargaining power with respect to rail carriers. Many mills are served by more than one carrier or are located in districts with reciprocal switching rights. Mill operators have had extensive experience with negotiating new rail rates, such as multi-car rates in shipper-owned cars between two steel mills. Some operators indicate that they are aware of rail costing techniques and use them in order to evaluate proposed changes in rail rates.

SUMMARY

Shippers of semi-finished and basic steel products indicate that they have practical alternatives to rail transportation and that they have shipper bargaining power. Continued regulation of rail rates on these products may not be justified on the basis of a potential for shipper abuse.

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SUMMARY

Shippers of semi-finished and basic steel products indicate that they have practical alternatives to rail transportation and that they have shipper bargaining power. Continued regulation of rail rates on these products may not be justified on the basis of a potential for shipper abuse.

I - IRON AND STEEL SCRAP

BACKGROUND

In 1975, over 41 million tons of iron and steel scrap were received at plants throughout the U.S. The major users of scrap are steel companies and iron foundries. There are close to 20 major grades of scrap metal; in general, scrap metal is dense, frequently over-sized, and sharp-edged. The iron and steel scrap industry has traditionally been a heavy rail user. The reliance on rail is attributable in part to the physical charactertistics of iron and steel scrap. Bulk commodity carriers, such as railroads, are well suited to accomodate shipments of this type.

RAIL TRAFFIC FLOWS

An analysis of the 1977 iron and steel scrap rail traffic indicates that the prinicpal destinations of scrap shipments are steel companies and iron foundries located in the Official and Western Trunk Line territories. It can also be seen that the scrap market is regional. See Exhibit VI-28 for a summary of 1977 rail traffic flows. Although long-haul shipments of scrap occur, shippers indicate that the average distance of scrap shipments is approximately 175 miles, a relatively short haul.

TRANSPORTATION ALTERNATIVES

Shippers indicate that between 60 to 80% of total transportation expenditures go to rail carriers. The balance of the expenditures go to truck and barge carriers. Truck transportation is a practical alternative to a portion of this rail traffic; it is especially viable under any of the following conditions:

- Length of haul is less than 200 miles.
- Delivery terms calls for quick shipment.
- Back-haul trucking is available.

In fact, many shippers have used trucks more in recent years as a result of the shortage of gondolas. A limiting factor to the use of trucks is the lack of availability of heavy duty trucks, which are often required to handle certain types of scrap.

SHIPPER BARGAINING POWER

Shippers have little bargaining power with rail carriers. Shippers indicate that carriers have little interest in hauling scrap due to the short haul, higher switching costs associated with serving scrap yards in large industrial cities, and lack of supply of equipment.

SUMMARY

Truck is a practical alternative for a portion of the rail traffic in iron and steel scrap. Major shippers have little form of shipper bargaining power. Continued regulation of rail rates for iron and steel scrap may not be justified on the basis of a potential for shipper abuse.

J - CEMENT, SAND, AND AGGREGATES

BACKGROUND

This section contains a discussion of cement, sand, and aggregates (as gravel). The principal type of cement produced in the U.S. is portland cement. The major users of cement are ready-mix concrete producers, concrete product manufacturers, highway contractors, and building materials dealers. Although the production and distribution characteristics of the sand and gravel industry differ from that of the cement industry, the principal users of sand and gravel are also associated with the construction or construction material industries.

In 1975, U.S. shipments of portland cement were estimated by the Department of Interior (Minerals Yearbook, 1975) to be 67.8 million tons. There are approximately 56 companies in the U.S. that produce portland cement and they operate an estimated 178 plants in 41 states. The top twenty cement producing companies control over 70% of the U.S. production capacity. The states with the largest production capacity include California in the West; Texas in the Southwest; Pennsylvania in the East; and Michigan and Missouri in the Midwest. The raw materials used in producing portland cement are limestone, cement rock, oyster shell, clay, and shale. Cement production is energy intensive and receipts of energy products at many cement-producing plants are substantial as well. (This discussion is limited to transportation alternatives available to cement producers for shipment of the outbound product).

An estimated 789 million tons of sand and gravel were produced in 1975. In sharp contrast to the cement industry, the number of sand and gravel operations in the U.S. exceed 7,000. These operations are owned by an estimated 4,075 companies. Sand and gravel is produced in virtually every state in the U.S. The overwhelming use of sand and gravel is for construction purposes.

RAIL TRAFFIC FLOWS

Cement is shipped either directly to customers or to distribution terminals. Table VI-10 indicates the distribution pattern of portland cement shipments in 1975. Over 60% of total shipments were made by truck from the cement plant to the customer. Rail shipments of cement were almost entirely movements from the plant to the customer. This table does not show the mode of shipment from plant to distribution terminal; in 1975, these intra-company shipments were almost evenly divided between truck and rail.

TABLE VI-10

Shipments of Portland Cement from Plants in the U.S. for 1975 (Thousands of tons)

	Shipments to Consumer	
	From Distribution Terminal to Consumer	From Plant to Consumer
Railroad	1,061	7,473
Truck	15,072	43,389
Barge and Boat	36	641
Other	0	102
Total	16,169	51,605

Source: US Department of Interior, Minerals Yearbook, 1975.

As noted above, cement production is spread throughout the U.S. Plants typical serve a regional area. The summary of the rail traffic flows for cement from the 1977 One Percent Waybill Sample verify that the distribution of this product is regional. The largest traffic flows are within rate territories. Furthermore, no single rate territory dominates total rail traffic flows. Exhibit VI-29 presents summary traffic flows of cement based on the One Percent Waybill Sample.

Due to the widespread supplier locations, much of the sand and gravel produced is distributed locally. Exhibit VI-30 summarizes the rail traffic flows of sand and aggregates for 1977. These traffic flows are based on data from the One Percent Waybill Sample. The major traffic flows are within rate territories. But, the use of rail (as measured by the number of tons moved) for sand in the Official territory and for aggregates in the Southern territory is greater than it is for the other territories. The abundant supply and superior quality of sand and gravel deposits in certain areas of these territories may account for the greater distribution by rail.

It should also be noted that the demand for these commodities is seasonal (construction activity is greater during summer months) and cyclical. The level of construction activity is sensitive to changes in the availability of credit. In addition, the local or regional demand for these materials is sensitive to major construction projects, such as dams. Some indication of this demand variability is indicated by the Table VI-11 shown below.

The variation in demand for these commodities make it difficult for carriers and the Commission to estimate traffic revenue from year to year. As a result, it may not be possible to justify continued regulation of these rates unless adequate revenue for rail carriers can be assured. Contract rates or other private negotiation between shipper/carriers may be a potential approach.

TABLE VI-11

Portland Cement Production

	Millions of Tons
1973	83.6
1974	79.5
1975	67.8

Source: US Department of the Interior *Minerals Yearbook, 1975.*

TRANSPORTATION ALTERNATIVES

Cement, sand, and gravel are moved by truck, rail, and barge. Shippers indicate that the share of rail transportation as a percent of total tonnage shipped has been declining over the past years. When these commodities are shipped by rail, the movements are typically short intrastate movements in multiple cars. Truck is a practical alternative for a portion of this rail traffic for two reasons. First, truck transportation has important service differences, such as shorter transit times or same day delivery for which a shipper or receiver may pay a premium. Second, truck costs are not substantially higher than rail rates for a portion of this rail traffic. Typically, these materials are not moved long distances and, as a result, the cost advantages enjoyed by rail carriers for long-haul shipments of either commodities are not always appropriate.

SHIPPER BARGAINING POWER

Rail shippers of aggregates, sand, and cement indicate that they have little shipper bargaining power aside from their ability to divert some rail shipments to truck.

SUMMARY

An analysis of transportation alternatives indicates that shippers of sand, aggregates and cement have truck transportation as an alternative to a portion of their rail traffic. Continued regulation of rail rates for these commodities may not be justified on the basis of shipper abuse in those instances.

K - LUMBER AND PLYWOOD

BACKGROUND

Lumber and plywood are basic building materials used in the construction and building industries. There are three primary producing regions for lumber and plywood in the United States. The region accounting for the largest portion of total United States production is the Pacific Coast, which includes California, Washington, and Oregon. In 1976, the Pacific Coast region produced over 16.3 billion board feet of lumber. The state-by-state 1976 production total for the western producing region is presented in Exhibit VI-31. During the same year, the Pacific Coast produced approximately 10.4 billion square feet of plywood. A territorial breakdown of plywood production is presented in Exhibit VI-32.[2]

The second primary lumber producing area is the Inland West. In 1976, this area accounted for just over 4.0 billion board feet of lumber production. The state-by-state production is summarized in Exhibit VI-31. During 1976, the Inland West produced approximately 1.2 billion square feet of plywood as well (see Exhibit VI-32).

The third primary producing region is the South. In 1976, the shipments (usually slightly less than total production) from this area were just over 2.7 billion board feet. A state-by-state summary is presented in Exhibit VI-33. Regional production of plywood was approximately 6.5 billion square feet in 1976 (see Exhibit VI-32). The South has shown a much faster increase in plywood as compared to lumber production.

Finally, it should be noted that Canada is a major supplier to the United States lumber market. In 1976, more than 7.9 billion board feet of lumber from Canada were imported.[1] British Columbia produced 6.3 billion board feet or 80%. While imports from the Canadian lumber industry have always been a

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1 Council of Forest Industries, Canada.

2 The Western territory appearing on Exhibit VI-32 is similar to the Pacific Coast territory of Exhibit VI-31.

factor in the United States markets, there is little export of lumber from the U.S. There is also little importation of plywood from Canada. However, there is an expanding export market which will be discussed later.

RAIL TRAFFIC FLOWS

The major traffic flows for lumber and plywood will be discussed separately.

1. Lumber. Exhibit VI-34 shows the major geographical markets for the four principal lumber producing areas identified above. As can be seen in this exhibit, the Coastal region has lost market share in all markets except the Mountain and Pacific markets. In both of these markets, the Coastal region's market share from 1968 to 1978 has remained constant.

The principal flows for the Inland West lumber are also shown in Exhibit VI-34. The Coastal region is similar to this producing area. The only market area in which market share has increased from 1968 to 1978 is the Mountain area.

The principal flows for Southern lumber are also shown in Exhibit VI-34. The Southern region data shows that this area has increased or held its market share constant in the following areas: Middle Atlantic, East-North Central, and East-South Central. In contrast to the Western producing regions, there have not been drastic shifts in the Southern lumber flows.

The Canadian contribution to the increase in United States lumber demand from 1970 to 1978 has been substantial. Canada has increased its market share in all U.S. market areas (see Exhibit VI-34).

An overview of the rail traffic flows is provided by an analysis of the One Percent Waybill Sample of 1977 lumber traffic. The principal traffic flows by originating and terminating rate territories are presented in Exhibit VI-35. They are:

- Transcontinental to Transcontinental (this represents over 40% of total lumber traffic)

- Transcontinental to Western Trunk Line (this represents over 15%)
- Transcontinental to Official (this represents over 15%)
- Transcontinental to Southwestern (this represents over 9%)
- Southern to Southern (this represents almost 8%)

2. Plywood. The primary plywood markets in order of their importance are as follows:[1]

- Residential construction market
- Homeowner market
- Industrial market
- Nonresidential construction market
- Export

As the residential construction and homeowner markets account for more than 60% of the total plywood market, the primary traffic flows are to those areas where there is a substantial demand for housing. The primary destination areas are major metropolitan areas throughout the country.

The top twenty geographical markets which account for 70.4% of demand grades of plywood in 1976 are shown in Exhibit VI-36. This Exhibit also shows the originating region for the plywood shipments. The plywood industry does not appear to be as regionalized as the lumber industry. For example, in the Washington/Baltimore market, just over 50% of the 1976 demand was met by Southern plywood producers. However, 41% of the demand was satisfied by Western plywood producers.

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1 Plywood Distribution Trends, American Plywood Association.

The One Percent Waybill Sample provides an overview of the primary rail flows for plywood in 1977. These flows are:

- Transcontinental to Transcontinental
- Transcontinental to Official
- Transcontinental to Western Trunk Line
- Southern to Southern
- Southern to Official

Exhibit VI-37 presents a summary of the rail transportation flows of plywood as indicated by the 1977 One Percent Waybill Sample.

TRANSPORTATION ALTERNATIVES

The determination of the existance of transportation alternatives for the shippers and receivers of lumber and plywood will be made in each of the following categories:

- Lumber shipments from the Pacific Coast
- Lumber shipments from the Inland West
- Lumber shipments from the South
- Plywood shipments from the Pacific Coast
- Plywood shipments from the Inland West
- Plywood shipments from the South

1. Lumber Shipments From The Pacific Coast. Exhibit VI-38 shows the percentage of lumber shipments originating in western states that utilize rail or motor carrier transportation. As can be seen, the Pacific Coast states of Oregon and Washington have shown a significant decline in rail utilization between 1968 and 1976. This decline in the use of rail has been offset by increased use of truck transportation.

The decline in rail use is due in part to the substantially larger shipments from Pacific Coast states to destinations in the West. The regionalization of Pacific Coast flows has made truck transportation competitive with rail on a greater proportion of total shipments. Rail transportation has some

cost advantages over truck transportation for long haul movements from the West to Eastern markets, but as noted earlier, the market share of Western lumber in Eastern markets has been declining.

2. Lumber Shipments From The Inland West. Every state in the Inland West (except Utah) has seen a steady decline in rail utilization from 1968 to 1976 (see Exhibit VI-38). Motor carrier transportation has been and will continue to be an alternative to rail transportation.

3. Lumber Shipments From The South. The South has also shown a record of decline in rail utilization since 1970. Exhibit VI-39 shows that the total rail market share for lumber traffic originating in the South has declined from 30.6% in 1970 to 24.1% in 1976. The proximity of the geographical markets that the South has traditionally served is largely responsible for the presence of truck competition for rail traffic.

4. Plywood Shipments From The Pacific Coast. Although there has been some decline from 1974 to 1976 in the percentage of plywood shipments moving by rail, the majority of shipments still rely on rail (see Exhibit VI-40). Motor carriers provide a practical alternative for rail transportation in those instances where the haul is relatively short. Plywood shipments from the Pacific Coast area to markets in the Midwest and East are likely to move by rail given the cost advantages enjoyed by rail carriers for long haul shipments.

5. Plywood shipments From The Inland West. Data on shipments of plywood by mode for 1974 to 1976 indicate that rail use has declined (see Exhibit VI-40). Truck transportation represents an alternative to rail for a portion of the rail traffic. Once again, truck transportation is most competitive for shorter hauls.

6. Plywood Shipments From The South. According to Exhibit VI-40, rail shipments of plywood from the South have modestly declined from 1974 to 1976. Truck transportation represents an alternative to only a portion of this rail traffic.

In conclusion, there has been a decline in the use of rail transportation in the lumber and, to a smaller extent, plywood industries. This decline is due in part to regional nature of the markets. A combination of factors has resulted in a greater proportion of lumber production in the West remaining in that area. This, in turn, allows the motor carriers a chance for greater participation in lumber traffic. The plywood industry has not experienced such dramatic shifts due to the product specialization of Southern and Western plywood and the less important role of Canadian producers as a competitor.

SHIPPER BARGAINING POWER

Shippers and receivers of lumber and plywood have some form of bargaining power. First, receivers in the Midwest, South, and East can receive lumber from more than one origin. Second, some firms operating in the forest products industry are multi-plant, multi-region, and multi-commodity firms. These firms have an impact on the demand for rail transportation through plant, region, or even commodity shifts. Third, some lumber and plywood firms operate short-line railroads. This provides them with a participatory voice in rate negotiations.

Small, independent producers do not have much bargaining power. They do not have the leverage of plant or commodity shifts. Their primary control over rail transportation demand lies in their ability to market products close to the production source. In this way, motor carrier transportation becomes a viable alternative.

SUMMARY

Truck transportation represents an alternative for a portion of the rail traffic. In addition, an analysis of shipper bargaining power indicates that, with a few exceptions, the shippers and receivers in the lumber and plywood industries have some bargaining power to negotiate with rail carriers. Continued regulation of rail rates in the lumber and plywood industries may not be justified on the basis of a potential for shipper abuse.

L - PULPWOOD LOGS AND CHIPS

BACKGROUND

Pulpwood logs and chips are the major sources of wood fiber used to make paper. Although logs and chips are the primary raw material for paper production, there are major differences in the physical characteristics of each commodity.

Pulpwood logs are harvested from the forest and transported to the pulp mill. The logs are normally cut to prescribed lengths of five to eight feet. However, there are instances where tree length logs are moved to the pulp mills for further processing. Pulpwood chips, on the other hand, are a waste material from sawmills and plywood plants. Chips are accumulated at these plants and then transported to the pulp mill for processing.

RAIL TRAFFIC FLOWS

Pulpwood logs and chips are low value commodities transported in large volumes. An analysis of the One Percent Waybill Sample of 1977 rail traffic indicates that the logs and chips are usually within 300 miles of the pulp processing mills.

There is an expanding export market for pulpwood chips in Scandinavia and Europe. There are substantial pulping capacities that are located overseas which demand wood fiber raw materials. The wood fiber is in limited supply. As a result, the Scandinavians have, at times, offered a premium for wood chips produced in the United States. To accomodate this demand, chip loading facilities have been located on the Gulf Coast and South Atlantic Coast for the transloading of chips from rail or motor carrier into ocean going vessels. The demand for export chips fluctuates, resulting in a certain degree of domestic uncertainty in price and supply.

There is no significant importation of pulpwood logs or chips. The only feasible source would be Canada; however, law prohibits the Canadians from exporting unprocessed wood fiber.

The One Percent Waybill Sample provides an overview of the rail flows from pulpwood log and chip sources to the terminating pulp mills. Exhibit VI-41 and Exhibit VI-42 show the primary flows for pulpwood logs and chips by originating and terminating rate territories. The principle rail flows for pulpwood logs are as follows:

- Southern to Southern (this flow accounted for over 75% of the total rail tonnage)
- Southwestern to Southwestern (this flow accounted for just over 9%)
- Western Trunk Line to Western Trunk Line (This flow accounted for over 6%)

The principle rail flows for pulpwood chips are as follows:

- Southern to Southern (this flow accounted for over 48% of the total rail tonnage)
- Transcontinental to Transcontinental (this flow accounted for over 38%)

There are several points that should be noted with regard to these traffic flows. First, the Southern territory dominates the movement of pulpwood logs and chips by rail. The top three paper and pulp producing states are Georgia, Alabama, and Louisiana.[1] Therefore the requirements for wood raw materials in this region are high. Second, Washington and Oregon are the principal pulp producing states in the Transcontinental rate territory.[2]

Finally, the Southwestern flow is primarily made up of log movements in Western Louisiana, Eastern Texas, and Southern Arkansas. The Western Trunk Line territory flows of logs are primarily movements in Wisconsin, a major paper producing state.

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1 Lockwood's Directory, 1979.

2 Ibid.

TRANSPORTATION ALTERNATIVES

The analysis of transportation alternatives will be made in the two primary originating regions, the South and the Pacific Coast.

(a) South

In 1977, the railroads in the South moved slightly less than 50% of the total pulpwood log traffic. Motor carriers and water carriers moved slightly more than 50%.[1] It is important to note that pulpwood logs include both short logs and long logs (tree length). During the same year, rail carriers moved slightly more than 50% of the total pulpwood chip traffic while the motor carriers and water carriers moved slightly less than 50%.[2] In the case of both logs and chips, water transportation was not a major competitive factor.

(b) Pacific Coast

The most recent available data for the West are shipments in 1974. In 1974, approximately 30% of the pulpwood chips moving in this territory moved by motor or water carrier.[3] Pulpwood logs are not a major commodity in the West.

Pulpwood logs and chips have characteristics that favor rail and truck transportation. On one hand, these commodities are of low value and are shipped in large volumes. These characteristics favor rail shipment. On the other hand, these commodities are shipped short distances. This characteristic favors truck transportation. Truck transportation does represent an alternative for a portion of this rail traffic.

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1 American Pulpwood Association, 1978 Wood Fiber Forecast for the South.

2 Ibid.

3 American Pulpwood Association, 1974 Wood Fiber Forecast for the West.

SHIPPER BARGAINING POWER

The shippers of pulpwood logs and chips are typically integrated pulp and paper producers. In many instances, the firms are multi-plant, multi-region, and multi-commodity firms. In addition, most major pulp and paper manufacturers have a choice of rail service, as more than one rail carrier usually serve a pulp and paper mill.

The bargaining power of these shippers is also related to the fact that integrated (pulp and paper producing) paper facilities generate large amounts of revenue for rail carriers. Their ability to negotiate rail rates is due in part to the other, more attractive paper traffic they control.

SUMMARY

The proximity of the origins to the pulp producing mills suggests that truck transportation is alternative to rail shipments. In addition, most major pulp and paper facilities are served by more than one rail carrier. Bargaining power through the shipment of other commodities may also keep the transportation enviornment for pulp wood logs and chips under competitive control. Continued regulation of rail rates may not be justified on the basis of a potential for shipper abuse.

EXHIBIT VI-1

U.S. WHEAT PRODUCTION BY STATE
(1973-77 Five-Year Average)

	Millions of Bushels	Percent of U.S. Total
Kansas	348	18%
North Dakota	247	13
Oklahoma	156	8
Montana	134	7
Washington	121	6
Minnesota	102	5
Texas	101	5
Nebraska	98	5
Colorado	61	3
Illinois	60	3
Other States	529	27
U.S. TOTAL	1,957	100%

SOURCE: USDA *Crop Production Reports: 1973-77*

EXHIBIT VI-2

U.S. CORN PRODUCTION BY STATE
(1973-77 Five-Year Average)

	Millions of Bushels	Percent of U.S. Total
Iowa	1,112	19%
Illinois	1,088	19
Wisconsin	970	17
Indiana	560	10
Nebraska	521	9
Minnesota	443	8
Ohio	319	6
Missouri	185	3
Kansas	152	3
Texas	122	2
Other States	296	5
U.S. TOTAL	5,768	100%

SOURCE: USDA Crop Production Reports: 1973-77

EXHIBIT VI-3

U.S. SORGHUM PRODUCTION BY STATE
(1973-77 Five-Year Average)

	Millions of Bushels	Percent of U.S. Total
Texas	325	43%
Kansas	182	24
Nebraska	115	15
Missouri	37	5
Oklahoma	21	3
California	15	2
Arkansas	10	1
South Dakota	9	1
Colorado	8	1
North Carolina	4	1
Other States	36	5
U.S. TOTAL	762	100%

SOURCE: USDA Crop Production Reports: 1973-77

EXHIBIT VI-4

U.S. SOYBEANS PRODUCTION BY STATE
(1973-77 Five-Year Average)

	Millions of Bushels	Percent of U.S. Total
Illinois	276	19%
Iowa	229	16
Indiana	122	8
Missouri	113	8
Minnesota	102	7
Arkansas	101	7
Ohio	98	7
Mississippi	65	4
Louisiana	51	3
Tennessee	42	3
Other States	273	19
U.S. TOTAL	1,472	100%

SOURCE: USDA Crop Production Reports: 1973-77

EXHIBIT VI-5

U.S. BROILER PRODUCTION BY STATE
(1977)

	Millions of Birds	Percent of U.S. Total
Arkansas	570	17%
Georgia	486	14
Alabama	428	13
North Carolina	339	10
Mississippi	256	8
Maryland	199	6
Texas	185	5
Deleware	156	5
California	113	3
Virginia	98	3
Other States	570	17
U.S. TOTAL	3,400	100%

SOURCE: USDA Agricultural Statistics: 1978

EXHIBIT VI-6

CATTLE AND CALVES ON FEED BY STATE
(As of January 1, 1978)

	Thousands of Heads	Percent of U.S. Total
Texas	1,850	14%
Nebraska	1,700	13
Iowa	1,690	13
Kansas	1,400	10
Colorado	1,020	8
California	845	6
Illinois	650	5
Arizona	422	3
Minnesota	400	3
South Dakota	365	3
Other States	3,108	23
U.S. TOTAL	13,450	100%

SOURCE: USDA *Agricultural Statistics: 1978*

EXHIBIT VI-7

NUMBER OF MILK COWS BY STATE
(1977)

	Thousands of Heads	Percent of U.S. Total
Wisconsin	1,802	16%
New York	914	8
Minnesota	866	8
California	827	8
Pennsylvania	703	6
Michigan	403	4
Ohio	400	4
Iowa	386	4
Texas	315	3
Missouri	298	3
Other States	4,070	37
U.S. TOTAL	10,984	100%

SOURCE: USDA *Agricultural Statistics: 1978*

EXHIBIT VI-8

PIG CROP BY STATE
(1977)

	Thousands of Pigs	Percent of U.S. Total
Iowa	21,339	25%
Illinois	9,430	11
Missouri	6,531	8
Minnesota	6,498	8
Indiana	5,587	6
Nebraska	4,970	6
Kansas	3,176	4
North Carolina	3,175	4
South Dakota	2,744	3
Wisconsin	2,730	3
Other States	20,011	23
U.S. TOTAL	86,191	100%

SOURCE: USDA *Agricultural Statistics: 1978*

EXHIBIT VI-9

SHIPMENT OF CORN FOR FOOD USE
(Million bushels-grain equivalent)

Shipments	1968	1977
Wet corn milling	207	380
Dry milling:		
corn meal	33	17
corn flour	4	18
hominy grits	21	10
breakfast foods	22	25
Alcoholic beverages:		
distilled liquors	33	22
fermented malt liquors	42	57
Total Shipement	362	529

SOURCE: USDA *Situation Reports, FDS-269*

EXHIBIT VI-10

U.S. RICE PRODUCTION BY STATE
(1975-77 Three-Year Average)

	Thousands of Cwt.	Percent of U.S. Total
Arkansas	38,844	34%
Texas	24,275	21
California	23,370	20
Louisiana	21,571	19
Mississippi	5,718	5
Missouri	658	1
U.S. TOTAL	114,436	100%

SOURCE: USDA *Agricultural Statistics: 1978*

EXHIBIT VI-11

PRODUCTION OF FATS AND OILS IN 1977

	Million Pounds	Percent of U.S. Total
Soybean Oil	10,335	65%
Cottonseed Oil	1,525	10
Butter	1,075	7
Lard	1,000	6
Edible Tallow	700	4
Corn Oil	700	4
Other Fats and Oils	455	3
U.S. TOTAL	15,790	100%

SOURCE: USDA *Situation Reports, FDS-292*

EXHIBIT VI-12

WHEAT FLOUR MILLING CAPACITY BY STATE[1]

State	Activity Capacity in Thousands of Cwt.	Percent of U.S. Total
Kansas	120	11%
Minnesota	119	11
New York	114	10
Missouri	82	7
Ohio	70	6
Illinois	60	5
California	47	4
Tennessee	39	4
Pennsylvania	34	3
Oklahoma	31	3
Other States	379	35
U.S. TOTAL	1,095	100%

1 Includes soft wheat, whole wheat and durum wheat flour.

SOURCE: Sosland Publishing Co. Milling Directory/Buyer's Guide: 1978

EXHIBIT VI-13

NUMBER OF WET CORN PROCESSING PLANTS BY STATE

State	Number
Iowa	5
Indiana	4
Illinois	3
Texas	2
Missouri	1
Ohio	1
Pennsylvania	1
Tennessee	1
TOTAL	18

SOURCE: Sosland Publishing Co. *Milling Directory/Buyer's Guide: 1978*

TWELVE STATES WITH THE GREATEST NUMBER OF SOYBEAN PROCESSING PLANTS[1]

State	Number
Iowa	15
Illinois	14
Mississippi	13
Arkansas	7
Indiana	6
Tennessee	6
Minnesota	5
North Carolina	5
Georgia	4
Kansas	4
Ohio	4
South Carolina	4

1 There are another 11 states with one to three soybean processing plants..

SOURCE: American Soybean Association *Soybean Digest Blue Book: June 1977*

UNEXPANDED ONE PERCENT WAYBILL SAMPLE --
WHEAT FLOUR MILLING PRODUCTS SHIPMENTS FOR 1977

(Tons)

Origin Territory	Destination Territory					
	Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	13,917	2,825	220	40	--	17,002
Southern	--	3,783	--	--	--	3,783
Western Trunk Line	12,048	1,442	18,102	937	497	33,026
Southwest	50	3,698	--	8,438	100	12,286
Transcontinental	--	--	87	33	4,262	4,382

SOURCE: One Percent Waybill Sample for 1977.

EXHIBIT VI-15

UNEXPANDED ONE PERCENT WAYBILL SAMPLE --
WET CORN MILL PRODUCTS SHIPMENTS FOR 1977

(Tons)

Origin Territory	Destination Territory					
	Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	11,896	3,494	--	235	483	16,108
Southern	284	534	--	111	288	1,217
Western Trunk Line	3,533	987	5,024	2,118	4,060	15,722
Southwest	--	155	131	1,083	680	2,049
Transcontinental	--	--	--	--	--	--

SOURCE: One Percent Waybill Sample for 1977.

EXHIBIT VI-16

UNEXPANDED ONE PERCENT WAYBILL SAMPLE FOR 1977

(Tons)

FATS AND OILS

Origin Territory	Destination Territory: Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	7,843	2,128	106	387	98	10,562
Southern	2,783	6,640	--	245	76	9,744
Western Trunk Line	2,651	279	11,132	3,954	5,376	23,392
Southwest	479	797	1,056	8,414	1,569	12,315
Transcontinental	567	--	1,347	422	1,220	3,556

SEED, NUT AND VEGETABLE, CAKE OR MEAL

Origin Territory	Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	13,278	2,803	--	56	--	16,137
Southern	547	9,943	--	371	--	10,861
Western Trunk Line	196	582	7,150	711	4,195	12,834
Southwest	77	1,812	246	7,516	--	9,651
Transcontinental	--	--	--	--	360	360

SOURCE: One Percent Waybill Sample for 1977.

Exhibit VI-17

UNEXPANDED ONE PERCENT WAYBILL SAMPLE -- FRESH MEAT SHIPMENTS FOR 1977

(Tons)

Origin Territory	Destination Territory: Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	762	81	81	--	--	909
Southern	--	182	--	112	--	294
Western Trunk Line	1,826	273	822	160	543	3,624
Southwest	--	110	59	374	--	543
Transcontinental	--	--	124	58	551	733

SOURCE: One Percent Waybill Sample for 1977.

UNEXPANDED ONE PERCENT WAYBILL SAMPLE FOR 1977

(Tons)

FRESH VEGETABLES

Origin Territory	Destination Territory: Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	31	--	--	--	--	31
Southern	173	--	--	--	--	173
Western Trunk Line	--	--	--	--	--	--
Southwest	338	--	--	--	--	338
Transcontinental	6,046	495	1,512	143	73	8,269
CITRUS FRUITS						
Official	--	--	--	--	--	--
Southern	62	--	--	--	--	62
Western Trunk Line	--	--	--	--	--	--
Southwest	--	--	--	--	--	--
Transcontinental	3,088	--	182	119	--	3,389

SOURCE: One Percent Waybill Sample for 1977.

UNEXPANDED ONE PERCENT WAYBILL SAMPLE --
CANNED FRUITS AND VEGETABLES SHIPMENTS FOR 1977

(Tons)

Origin Territory	Destination Territory: Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	3,354	1,828	166	448	--	5,796
Southern	4,471	1,439	44	299	415	6,668
Western Trunk Line	1,012	479	1,776	1,189	280	4,736
Southwest	--	65	--	82	--	147
Transcontinental	1,947	339	2,290	507	1,661	6,744

SOURCE: One Percent Waybill Sample for 1977.

SUGARBEET PRODUCTION BY STATE FOR 1976

	Thousands of Tons	Percent of U.S. Total
California	8,829	30
Minnesota	3,026	10
Idaho	2,886	10
Colorado	2,311	8
North Dakota	2,070	7
Washington	1,874	6
Nebraska	1,690	6
Michigan	1,536	5
Wyoming	1,168	4
Montana	968	3
Other States	3,104	11
U.S. Total	29,462	100%

Source: USDA *Prospective Plantings Report April, 1977*

UNEXPANDED ONE PERCENT WAYBILL SAMPLE --
REFINED SUGAR SHIPMENTS FOR 1977

(Tons)

Origin Territory	Destination Territory					
	Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	3,675	369	--	--	--	4,044
Southern	3,228	8,963	--	619	--	12,810
Western Trunk Line	2,223	--	6,038	717	--	8,978
Southwest	887	599	1,126	7,027	210	9,849
Transcontinental	992	--	8,354	719	1,730	11,795

Source: One Percent Waybill Sample for 1977.

EXHIBIT VI-23

1976 PRODUCTION OF BITUMINOUS AND LIGNITE COAL BY STATE

	Millions of Tons	Percent of U.S. Total
Kentucky	144.0	21%
West Virginia	108.8	16
Pennsylvania	85.8	13
Illinois	58.2	9
Ohio	46.6	7
Virginia	40.0	6
Wyoming	30.8	5
Montana	26.2	4
Indiana	25.4	4
Alabama	21.5	3
Other States	91.4	13
U.S. TOTAL	678.7	100%

SOURCE: Department of Interior Coal-Bituminous and Lignite in 1976

UNEXPANDED ONE PERCENT WAYBILL SAMPLE --
STEAM BITUMINOUS COAL SHIPMENTS FOR 1977[1]

(Tons)

Origin Territory	Destination Territory					
	Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	464,903	42,305	420	344	176	508,148
Southern	98,298	452,611	1,091	390	--	552,390
Western Trunk Line	14,528	--	87,518	5,036	--	107,081
Southwest	91	79	2,960	15,107	549	18,786
Transcontinental	40,677	--	236,504	23,466	61,930	362,577

1 Includes shipment of steam bituminous coal for export.

SOURCE: One Percent Waybill Sample for 1977.

UNEXPANDED ONE PERCENT WAYBILL SAMPLE -- IRON ORE SHIPMENTS FOR 1977

(Tons)

Origin Territory	Destination Territory					
	Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	100,523	19,341	--	--	--	119,864
Southern	--	7,455	--	77	--	7,532
Western Trunk Line	5,759	--	37,934	--	100	43,793
Southwest	--	--	82	100	--	182
Transcontinental	--	--	--	--	17,603	17,603

SOURCE: One Percent Waybill Sample for 1977.

UNEXPANDED ONE PERCENT WAYBILL SAMPLE -- SEMI-FINISHED AND BASIC STEEL PRODUCTS SHIPMENTS FOR 1977

(Tons)

Origin Territory	Destination Territory					
	Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	39,579	2,737	51	946	521	43,834
Southern	4,159	203	--	221	--	4,583
Western Trunk Line	--	--	323	--	--	323
Southwest	--	92	--	681	--	773
Transcontinental	--	--	--	--	6,597	6,597

SOURCE: One Percent Waybill Sample for 1977.

PERCENT DISTRIBUTION OF IRON AND STEEL PRODUCTS BY MEANS OF TRANSPORTATION 1967-1972

Iron and Steel Products	Percent of Total Ton-Miles							
	Rail		Truck		Water		Total	
	1967	1972	1967	1972	1967	1972	1967	1972
Coke Oven and Blast Furnace Products (including Pig Iron)	89	71	4	13	8	16	100	100
Steel Ingot and Semifinished Shapes	75	73	12	9	13	17	100	100
Iron and Steel Plates	62	61	17	27	22	12	100	100
Sheet and Strip	42	39	36	54	22	7	100	100
Bars, Bar Shapes and Rods	53	54	39	41	7	5	100	100
Pipe, Tubes and Fittings	69	49	22	45	9	6	100	100
Tin Mill Products	60	55	19	31	22	14	100	100
Total	59	51	26	40	16	9	100	100

SOURCE: US Department of Commerce, Census of Transportation, 1967, 1972.

UNEXPANDED ONE PERCENT WAYBILL SAMPLE -- IRON AND STEEL SCRAP SHIPMENTS FOR 1977

(Tons)

Origin Territory	Destination Territory					
	Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	64,399	1,466	414	324	724	67,327
Southern	3,044	14,158	--	577	--	17,779
Western Trunk Line	257	--	10,335	1,087	911	12,590
Southwest	285	460	648	4,815	36	6,244
Transcontinental	30	--	150	--	4,589	4,769

SOURCE: One Percent Waybill Sample for 1977.

EXHIBIT VI-29

UNEXPANDED ONE PERCENT WAYBILL SAMPLE --
HYDRAULIC CEMENT SHIPMENTS FOR 1977

(Tons)

Origin Territory	Destination Territory: Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	13,256	1,357	253	604	52	15,525
Southern	45	17,091	--	1,123	123	18,382
Western Trunk Line	--	72	14,056	--	686	14,814
Southwest	134	814	1,289	10,823	148	13,208
Transcontinental	--	--	1,200	332	13,703	15,235

SOURCE: One Percent Waybill Sample for 1977.

EXHIBIT VI-?

UNEXPANDED ONE PERCENT WAYBILL SAMPLE --
SHIPMENTS FOR 1977

(Tons)

SAND

Origin Territory	Destination Territory: Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	45,354	1,421	75	92	--	46,942
Southern	990	8,528	234	288	100	10,140
Western Trunk Line	257	--	2,509	1,253	1,979	5,998
Southwest	1,740	2,365	200	8,398	548	13,251
Transcontinental	60	--	93	115	3,696	3,964

AGGREGATES

Origin Territory	Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	17,386	1,571	345	85	88	19,475
Southern	5,314	50,599	426	1,230	157	57,686
Western Trunk Line	2,208	55	11,729	190	539	14,721
Southwest	338	2,370	73	12,145	76	15,002
Transcontinental	127	--	303	219	4,961	5,610

SOURCE: One Percent Waybill Sample for 1977.

EXHIBIT VI-31

WESTERN PRODUCING REGION

TOTAL PRODUCTION BY STATE - 1976

Producing State	Million Board Feet	
California	5,333	
Oregon	7,335	
Washington	3,661	
Pacific Coast Region		16,329
Arizona	380	
Colorado	230	
Idaho	1,908	
Montana	1,197	
New Mexico	242	
South Dakota	78	
Utah	56	
Wyoming	201	
Inland West Region		4,292
Western Producing Region Total		20,621

Source: Western Wood Products Association *Statistical Yearbook 1977.*

EXHIBIT VI-32

U.S. DOMESTIC PRODUCTION OF SOFTWOOD PLYWOOD BY REGION
(Thousands of Sq. Ft. - 3/8" Basis)

YEAR	WESTERN	SOUTHERN	INLAND	TOTAL
1960	7,738,341	- - -	77,240	7,815,581
1961	8,397,040	- - -	180,212	8,577,252
1962	9,276,629	- - -	236,328	9,512,957
1963	9,857,706	- - -	358,535	10,216,241
1964	11,103,307	80,024	495,290	11,678,621
1965	11,314,780	401,708	730,124	12,446,612
1966	11,024,642	1,139,550	892,049	12,056,241
1967	10,116,364	1,779,182	1,062,033	12,957,579
1968	11,257,305	2,372,557	1,064,678	14,694,540
1969	9,900,961	2,875,355	918,076	13,694,392
1970	10,119,603	3,315,005	905,172	14,339,780
1971	11,202,089	4,410,062	1,022,820	16,634,971
1972	11,936,701	5,318,848	1,068,205	18,323,754
1973	11,714,987	5,558,618	1,030,994	18,304,599
1974	9,752,528	5,130,155	995,697	15,878,380
1975	9,300,626	5,675,497	1,074,057	16,050,180
1976	10,400,000	6,500,000	1,200,000	18,400,000

Source: American Plywood Association Regional Production and Distribution Patterns of the Softwood Plywood Industry

EXHIBIT VI-33

SOUTHERN PRODUCING REGION

TOTAL SHIPMENTS BY STATE - 1976

Producing State	Million Board Feet
Alabama	327
Arkansas & Oklahoma	713
Florida	-
Georgia	70
Louisiana	312
Mississippi	558
North Carolina	141
South Carolina	184
Tennessee	1
Texas	303
Virginia	92
SOUTHERN REGION TOTAL	2,701

Source: Southern Forest Products Association Distribution of Southern Pinc Shipments 1977.

LUMBER SHIPMENTS TO SELECTED MARKET AREAS[1]
1968-1977 (in MM[2])

Producing Region	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	% Increase/ Decrease Between 1968-1977
NEW ENGLAND											
Inland (W.W.P A)	196.8	158.8	169.4	164.1	182.4	201.4	141.2	140.3	129.3	108.7	- 45
Coastal (W.W.P.A)	104.8	101.9	111.5	141.2	135.9	134.0	99.2	94.8	80.6	71.7	- 32
Southern (S.F.P.A)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-
Canadian	NA	NA	448.5	NA	NA	579.0	457.3	384.9	467.5	653.8	+ 46
Total	301.6	260.7	729.4	305.3	318.3	914.4	697.7	620.0	677.4	834.2	+ 14
MIDDLE ATLANTIC											
Inland	722.7	679.9	699.4	697.1	651.7	698.0	654.3	566 9	569.9	439.6	- 39
Coastal	284.7	243.2	289.4	332.8	344.0	325.0	266.0	238.0	176.1	137.6	- 52
S.F.P.A.	129.5	117.1	103.9	109.6	120.8	117.5	195.2	239.7	225.8	183.9	+ 42
Canadian	NA	NA	446.3	NA	NA	795.8	674.7	582.8	858.8	1,078.6	+ 142
Total	1,136.9	1,040.2	1,539.0	1,139.5	1,116.5	1,936.3	1,790.2	1,627.4	1,830.0	1,839.7	+ 20
EAST-NORTH CENTRAL											
Inland	2,286.0	1,989 3	1,715.7	1,859.7	1,785.1	1,776.7	1,460.3	1,338.9	1,491.6	1,233.0	- 46
Coastal	954.9	737.1	740.1	937.8	903.9	748.1	533.9	468.4	464.3	348.2	- 64
S.F.P.A.	972.8	1,032.9	996.5	1,113.7	1,102.3	977.4	907.4	1,033.6	1,094.3	1,178 8	+ 21
Canadian	NA	NA	1,177.4	NA	NA	1,672.3	1,394.6	1,049.9	1,617.5	2,267.9	+ 92
Total	4,213.7	3,668.3	4,629.7	3,911.2	3,791.3	5,174.5	4,296.2	3,890.8	4,667.7	5,027.9	+ 8
WEST-NORTH CENTRAL											
Inland	1,575.0	1,322.3	1,211 7	1,273.1	1,328.3	1,351.3	1,134.8	989 7	1,204.4	1,033.6	- 34
Coastal	930 7	805.7	807.7	924.0	1,036.7	935.5	756 8	804.1	785.0	625.2	- 33
S F.P.A.	447.9	394.6	388.1	476 4	492.8	410.7	402.4	431.8	524 3	535.8	+ 20
Canadian	NA	NA	796.8	NA	NA	1,388.8	966.8	955.1	1,595.4	2,401 6	+ 201
Total	2,953 6	2,522.6	3,204.3	2,673.5	2,857.8	4,086.3	3,260.8	3,180.7	4,109 1	4,596.2	+ 43
EAST-SOUTH CENTRAL											
Inland	361 2	313.4	316.4	313 9	350.4	309.1	253.3	239 6	280 1	243 6	- 33
Coastal	213 1	158.3	183.7	232 1	239.5	228.4	170.5	125.5	123.2	104 6	- 51
S.F.P A.	1,476 1	1,564 8	1 642.8	1,688 0	1,765.5	1,646.5	1,290.4	1,252.1	1,626.8	1,588 8	+ 8
Canadian	NA	NA	205.6	NA	NA	353 5	260.0	211.0	382.1	506 8	+ 147
Total	2,050.4	2,036 5	2,348 5	2,234.0	2,355 4	2,537 5	1,962.2	1,828.2	2,412.2	2,442 8	+ 4
SOUTH ATLANTIC											
Inland	539.8	496 1	492.0	540 [illegible]	60[illegible] 3	630.6	471 9	385 [illegible]	409.0	392 5	- 27
Coastal	301 4	285 3	280 9	318.[illegible]	377.6	333.2	231 6	187.9	192.4	177 0	- 41
S F.P A	1,035 7	1 073 2	1,175 3	1,365 0	1,401.0	1,346.7	1,166.[illegible]	1,089.9	1,219 2	1 224.3	+ 18
Canadian	NA	NA	367 3	NA	NA	976 1	606 0	543 5	863 0	1,160 6	+ 216
Total	1,876.9	1 854 6	2,315.5	2,273.7	2,387 9	3,286 6	2,556 1	2,206 7	2,683 6	2,954 4	+ 28
WEST-SOUTH CENTRAL											
Inland	679 9	615.4	6[illegible]1 1	722 8	694.[illegible]	616 2	508.9	540 2	597 [illegible]	665.6	2
Coastal	596 3	574 9	535 2	604 [illegible]	719.5	585.2	476.[illegible]	554 2	581 4	657 2	+ [illegible]0
S.F.P A	2,821 7	[illegible],605.2	2,554 9	2 001.1	3,175 2	[illegible],751 6	2 547 6	2,551 6	[illegible],055 4	[illegible],2[illegible]	+ [illegible]4
Canadian	NA	NA	19[illegible]	NA	NA	314 [illegible]	25[illegible].2	206 5	350 6	1 096 4	+ 4[illegible]
Total	4,097 9	3,855 6	3 902 7	4,328 [illegible]	4,589 0	4,267 [illegible]	3 78[illegible].4	3,852.[illegible]	4,587 7	5,623 9	+ 45
MOUNTAIN											
Inland	728 0	756 7	856 8	1,031 0	1,316 4	1,266.6	1,153.3	1,185.8	1,482 6	1,832 9	+ 152
Coastal	296 0	330.1	391 6	564 0	664.0	609.0	515.7	455 4	501 5	629 1	+ [illegible]1[illegible]
S F P A.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--
Canadian	NA	NA	16 [illegible]	NA	NA	68.6	4[illegible]	43 3	152 7	308 9	+1755
Total	1,024 0	1,066 [illegible]	1,264 7	1 5[illegible]	1,980.4	1,941 [illegible]	1,71[illegible] 2	1 684 5	2 [illegible] 8	2,770 9	+ 119
PACIFIC											
Inland	2,195.3	2 199 6	2,053 9	[illegible]	2 [illegible] 1	2,791 [illegible]	2,428 [illegible]	2,53[illegible] 6	2,916 9	[illegible],201 8	+ 4[illegible]
Coastal	2 131.0	2,207 4	1 933 6	[illegible],720 6	3 [illegible] 4	[illegible],100 3	3,0[illegible] 3	3,[illegible] 1	3 506 3	4 6[illegible]7 6	+ 115
S F P A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--
Canadian	NA	NA	2[illegible]8 5	NA	NA	428.5	34[illegible] 9	283 4	538 9	520 4	+ 2[illegible]
Total	4,376.[illegible]	4,407 [illegible]	4,286 2	[illegible],737.9	6,060 5	6,429.9	5,833 6	5,826 1	6,956 1	8 819 8	+ [illegible]6

1 - Market Areas.

New England	- Ma., N.H , Vmt , Mass., Conn , R.I
Middle Atlantic	- N Y , N.J , Penn
East-North Central	Ohio, Mich. Ill., Ind., Wis
West-North Central	- N.D., S.D , Minn. Neb , Iowa, Ks., Missouri
East-South Central	- Kentucky, Tenn , Alabama, Miss
South Atlantic	- Del., D C , Md , Va., W Va., N.C., S.C., Ga., Florida
West-South Central	- La., Ark., Ok , Texas
Mountain	- Mont , Id., Wy., N.M., Az., Colorado, Nev., Utah
Pacific	- Wash., Oregon, Ca.

2 - Percentage shift for both Canadian and "Total" producing regions was derived from a comparison of 1970 and 1977 figures.

Sources: Western Wood Products Assdociation
Southern Forest Products Association
Council of Forest Industries

UNEXPANDED ONE PERCENT WAYBILL SAMPLE -- LUMBER SHIPMENTS FOR 1977

(Tons)

Origin Territory	Destination Territory: Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	1,760	963	97	272	246	3,338
Southern	6,490	8,639	475	1,540	238	17,382
Western Trunk Line	522	120	689	99	182	1,611
Southwest	1,281	560	791	2,532	312	5,476
Transcontinental	17,765	4,418	17,957	11,187	35,303	86,629

SOURCE: One Percent Waybill Sample for 1977.

EXHIBIT VI-35

TOP 20 MARKETS FOR ALL GRADES OF PLYWOOD IN 1976
(Thousands of Sq. Ft. - 3/8" Basis)

TRADING AREA	WESTERN	%	INLAND	%	SOUTHERN	%	SHIPMENTS
Portland	782,349	96.5	28,375	3.5	---	--	810,724
San Francisco/Oakland	700,127	88.5	90,977	11.5	---	--	791,104
New York	406,755	56.2	123,040	17.0	193,969	26.8	723,764
Los Angeles	573,266	88.3	75,959	11.7	---	--	649,225
Chicago	246,126	39.9	119,053	19.3	251,677	40.8	616,856
Export	426,074	73.5	118,837	20.5	34,781	6.0	579,693
Charlotte	104,351	18.3	2,851	.5	463,022	81.2	570,224
Seattle	460,452	83.0	94,309	17.0	---	--	554,761
Detroit/Toledo	159,752	38.5	60,581	14.6	194,606	46.9	414,940
Atlanta/Chattanooga	67,833	18.2	2,236	.6	307,639	81.2	372,708
Boston	216,243	58.9	63,881	17.4	87,010	23.7	367,135
Philadelphia	123,999	35.5	56,236	16.1	169,058	48.4	349,293
Dallas/Ft. Worth	73,932	21.6	7,530	2.2	260,815	76.2	342,277
Houston	56,941	17.1	5,994	1.8	270,056	81.1	332,991
Salt Lake City	166,836	55.3	133,348	44.2	1,508	.5	301,692
Minneapolis/St. Paul	145,168	49.7	96,389	33.0	50,531	17.3	292,089
Milwaukee	115,736	41.6	66,493	23.9	95,983	34.5	278,212
Memphis	34,135	12.4	5,230	1.9	235,918	85.7	275,283
Spokane	84,780	32.6	175,282	67.4	---	--	260,062
Washington/Baltimore	105,099	41.0	22,814	8.9	128,425	50.1	256,338

Total Shipments to top 20 Markets 9,139,371

Total U.S. Shipments 12,972,778

Top 20 Markets as % of total market 70.4%

Source: American Plywood Association Regional Production and Distribution Patterns of the Softwook Plywood Industry

EXHIBIT VI-36

EXHIBIT VI-37

UNEXPANDED ONE PERCENT WAYBILL SAMPLE -- PLYWOOD SHIPMENTS FOR 1977

(Tons)

Origin Territory	Destination Territory					
	Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	755	122	85	--	136	1,098
Southern	5,066	5,493	146	595	45	11,345
Western Trunk Line	56	39	162	210	162	629
Southwest	3,246	1,443	2,644	2,809	139	10,281
Transcontinental	11,960	3,139	7,356	3,260	16,461	42,175

SOURCE: One Percent Waybill Sample for 1977.

EXHIBIT VI-38

LUMBER SHIPMENTS ORIGINATING IN WESTERN STATES BY RAIL AND TRUCK

Column R - Percent Rail Utilization
Column T - Percent Truck Utilization

	1968		1972		1976	
	R	T	R	T	R	T
Arizona	28.8	71.2	21.5	78.5	20.5	79.5
California	42.7	54.7	46.8	51.4	42.4	56.5
Colorado	44.6	55.4	29.1	70.9	9.6	90.4
Idaho	81.9	18.1	81.8	18.2	67.5	32.5
Montana	69.6	30.4	67.2	32.8	56.4	43.6
New Mexico	15.0	85.0	8.5	91.5	4.1	95.9
Oregon	71.4	14.9	68.5	19.1	59.9	29.2
South Dakota	26.6	73.4	13.2	86.8	0.7	99.3
Utah	--	100.0	13.4	86.8	1.3	98.7
Washington	66.1	23.2	62.4	28.8	52.9	38.3
Wyoming	62.8	37.2	35.9	64.1	7.4	92.6
Total	64.5	35.0	61.0	32.5	53.1	41.1

Note: Percentages do not always add to 100.0 because of the availability of water transportation.

Source: Western Wood Products Association *Statistical Yearbook*

EXHIBIT VI-39

LUMBER SHIPMENTS ORIGINATING IN SOUTHERN STATES BY RAIL AND TRUCK

Column R - Percent Rail Utilization
Column T - Percent Truck Utilization

	1970		1974		1976	
	R	T	R	T	R	T
Alabama	26.3	73.7	29.3	70.7	30.0	70.0
Arkansas & Oklahoma	42.8	57.2	38.7	61.3	27.5	72.5
Florida	19.1	80.9	.2	99.8	--	--
Georgia	8.5	91.5	21.2	78.8	37.4	62.6
Louisiana	26.7	73.3	13.8	86.2	12.1	87.9
Mississippi	40.9	57.1	34.5	65.5	37.4	62.6
North Carolina	16.8	83.2	.1	99.9	14.3	85.7
South Carolina	17.3	82.7	21.0	79.0	23.2	76.8
Tennessee	--	100.0	--	100.0	--	100.0
Texas	20.3	79.7	5.8	94.2	3.0	97.0
Virginia	18.0	82.0	6.6	93.4	12.5	87.5
Total	30.6	69.4	25.5	74.5	24.1	75.9

Source: Southern Forest Products Association Distribution of Southern Pine Shipments

EXHIBIT VI-40

U.S. PLYWOOD SHIPMENTS BY MODE

Region	Year	Percentage		
		Rail	Truck	Other
Pacific Coast	1974	77.0	20.0	3.0
	1975	71.4	25.7	2.9
	1976	73.8	23.3	2.9
Inland	1974	71.0	29.0	--
	1975	60.0	40.0	--
	1976	60.1	39.9	--
Southern	1974	69.0	30.0	1.0
	1975	67.8	32.1	.1
	1976	66.5	33.4	.1
Total U.S.	1974	74.0	25.0	1.0
	1975	68.5	30.1	1.4
	1976	69.1	29.6	1.3

Source: American Plywood Association

UNEXPANDED ONE PERCENT WAYBILL SAMPLE --
PULPWOOD LOG SHIPMENTS FOR 1977

(Tons)

Origin Territory	Destination Territory: Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	2,030	--	--	--	--	2,030
Southern	1,182	75,870	--	3,478	--	80,530
Western Trunk Line	527	--	6,426	--	135	7,088
Southwest	321	--	--	9,349	--	9,670
Transcontinental	--	--	--	48	1,569	1,617

SOURCE: One Percent Waybill Sample for 1977.

EXHIBIT VI-42

UNEXPANDED ONE PERCENT WAYBILL SAMPLE --
PULPWOOD CHIPS SHIPMENTS FOR 1977

(Tons)

Origin Territory	Destination Territory: Official	Southern	Western Trunk Line	Southwest	Transcontinental	Total
Official	838	--	--	--	--	838
Southern	248	43,694	--	1,093	--	45,035
Western Trunk Line	--	--	4,828	--	--	4,828
Southwest	--	53	32	5,574	--	5,659
Transcontinental	--	--	1,984	--	36,228	38,212

SOURCE: One Percent Waybill Sample for 1977.

VII - INTERPRETATION OF EMPIRICAL RESULTS

As discussed in the first chapters of this report, developing new standards and procedures for market dominance involves a synthesis of economic theory, public policy guidance, procedural design issues, and an understanding of the workings of transportation markets. The results of two different approaches to examining transportation markets were discussed in the two preceding chapters. The results of extensive statistical analysis of a rail transportation data base were reported in Chapter Five. A qualitative approach was presented in Chapter Six, in which shipper interviews and industry background information were employed in building an understanding of transportation competition and shipper bargaining power.

This chapter reviews the information in the two preceding chapters and utilizes it to explore alternative standards and procedures for implementing the concept of market dominance. This discussion is organized into three major sections.

- Characteristics of Rail Markets
- Rail Market Power and Shipper Protection
- Implications for Design of Regulatory Procedures

The first section describes what characteristics of rail transportation markets should be recognized in designing new procedures and in interpreting the results of other analyses. The second section discusses the competitive forces faced by rail carriers and of the counter-vailing effect of shipper bargaining power. In the third section the impact of these analyses on procedural design will be presented, both for market dominance implementation and related regulatory issues.

CHARACTERISTICS OF RAIL MARKETS

The most important single characteristic of the rail transportation market is its complexity. Transportation, as an industry filling derived demands, reflects the diverse and complex character of the United States economy--this is particularly true of railroads. While a rail carload of whiskey is handled by the same general technology as a unit coal

train, this similarity must not be allowed to obscure the major differences in the competitive forces, physical distribution strategies, pricing policies, costs of transportation, commodity competition, and public policy interest reflected in these two movements. Viewed in this light the rail transportation market is clearly too diverse for any one dimensional or simplistic approach to regulation to succeed. Indeed such complexity may in itself be an argument for limiting regulatory involvement in transportation markets to those segments where public policy objectives are explicitly served by such involvement.

This complexity gives rise to several problems in any regulatory design program. Two of the most important problems which were highlighted by the results reported in Chapter V, are discussed in the following paragraphs.

(a) Rail Market Mix

Railroads are often characterized as providing high volume transportation for low value bulk commodities as they do handle very large tonnages of coal, bulk grain, sand, ore and similar products. Coal is the single largest category of carloadings. Nonetheless, as shown in the tables in Chapter V, there are large tonnages (and, more importantly, large revenues) of higher valued manufactured goods moving by rail. In fact, TOFC/COFC traffic (which was omitted from the data base because of sampling and data difficulties) is now the second largest category of carloadings. This traffic is, of course, almost entirely higher valued manufactured commodities.

Railroad pricing strategies, investment policies and operating programs are predicated upon a given traffic mix, either the current one or some future one. Such planning is required because the type of investment and operations required to serve each type of traffic is very different. Thus, any regulatory intervention into rail markets must consider its impacts on the rail traffic mix and on the ability of carriers to reconfigure their operations to adjust to the new mix. For example, the carriers have gradually restructured their facilities and operations as rail passenger operations disappeared or became unimportant on most routes.

(b) Recognition of Exceptions

Virtually every commodity group or traffic segment examined in the statistical analysis had a minor amount of traffic which was significantly unlike the typical or average movement. This may be because of the grouping of specific specialized product movements in large categories. For example, while SPC Bank 24 (construction aggregates) are generally thought of as short haul commodities, a number of movements over 1,000 miles are found. Similarly, such long haul rail commodities as SPC 48 and 52 (lumber and plywood) also move by rail for distances under 50 miles. Wide variations are also found in revenue per ton and per carload, value per shipment, weight per shipment and so forth.

It is not clear whether these variations are the result of anomalies in the rate structure, aggregation of specialized product movements, short term transportation decisions or conditions, or other factors. Any general regulatory treatment of a segment of rail traffic must be constructed with a means for dealing with exceptional situations. This simply recognizes that general characterizations of rail traffic are rarely completely accurate. However, if the confidence level of the generality is high, a well conceived exception procedure should be sufficiently stringent to assure the general rule is appropriately applied.

RAIL MARKET POWER AND SHIPPER ABUSE

Chapter III concluded that shipper abuse would rarely occur where transportation competition for the traffic was present. In competitive markets it is therefore preferable to rely on market forces to protect shippers rather than on regulatory intervention. Where competition is not effective, shipper abuse still may not occur because of shipper bargaining power or commodity competition, but the potential for shipper abuse is still present. In this section the results of the qualitative and quantitative analysis of transportation market competition are presented together with a discussion of the role of countervailing shipper bargaining power.

(a) Intermodal Competition

Both motor carriers and barge operators compete intensively with rail for certain segments of rail traffic. Water transportation is employed primarily for high volume movements of bulk

commodities and tends to be actively competitive for rail transportation only at the margins of rail markets as most water movements involve origins and/or destinations directly on the water. The relatively high cost of transloading results in a rapid reduction in water competitiveness as the distance from a waterway increases or as the total length of haul decreases. Consequently, an analysis of existing rail traffic tends to identify very few water competitive movements; truly competitive movements are already moving by water. For this reason, the emphasis in this analysis of intermodal competition for rail traffic was confined to motor carrier competition.

Motor carriers compete with railroads both on a direct price basis and on a higher-cost/better-service basis. The measurement of this form of competition is "hardly" an exact science. The analysis formulated for this study was discussed in Chapters IV, V, and VI. The data is incomplete, movement characteristics are not known with certainty. Variations in motor carrier cubic capacity, weight capacity, and empty backhaul ratios occur. All of these factors limit the precision of the results. Moreover, the methods by which service sensitivity were approximated in the statistical analysis are open to debate.

If a conservative estimate of rail truck competitiveness is utilized approximately 20% and 40% of rail carloads, other than intermodal service, is competitive with motor carriers depending on service sensitivity. A lower range of truck cost estimates (and one which may in fact be more realistic) yields a range of 30% to 50% of rail carloads as truck competitive. A significant proportion of rail traffic is estimated to face effective motor carrier competition.

This conclusion is supported by the qualitative review of transportation competition in specific market areas. For example grain shippers reported that motor carrier service was competitive with rail in movements of 200-300 miles or less depending on the region. Producers of manufactured iron and steel products indicated that decisions are made almost daily as to whether movements go by truck or rail, so competitive is the marketplace.

Since the competitiveness of motor carrier on shorter movements was consistently revealed by in the qualitative analysis, regression equations were developed to estimate the break-even mileages for truck/rail competition. (See Chapter V for the full discussion of this analysis.) This approach distinguishes

the presence of motor carrier competition within such commodities as wheat,furniture, and within which both truck competitive and non-truck competitive movements were found. In general, the statistical results compare favorably with the observations from the qualitative analysis. Some typical commodities are discussed below:

1. Wheat - The shippers reported that motor carrier competition was viable up to 200 to 300 miles depending on the region. The regression results yielded break-even mileages from approximately 150 to 250 miles depending on the motor carrier cost range employed. Regional differences in rail rates and service quality appear to account for much of the variation here. Thus it would appear that motor carriers provide wheat shippers with a competitive alternative on shipments under 200-250 miles.

2. Construction Aggregates - Sand and gravel for construction were found to be primarily a short haul product with motor carrier service being a viable alternative for the very short movements. The regression analysis was indeterminate because it produced a break-even mileage in the range where neither the truck nor the rail costing procedures are reliable (i.e., under 25 miles). For such very short distances rail would appear to be a reasonable alternative to truck only where the rail route structure itself permits. Where rail service does exist and where movements of 25 to 50 miles or more are involved, truck competition may only have a limited role. This conclusion is clouded, however by two factors. First, the rail market share has continually declined in recent years. Second, rail costing procedures (and the ratemaking which they support) tend not to reflect the relatively higher cost of short aggregate movements resulting from low car utilization, multiple terminal rehandlings, and inefficient scheduling of crews on very short assignments.

3. Canned Foods - The motor carrier alternative was reported feasible by a number of canned goods producers. This is especially true for private fleet operations. No specific distances were mentioned by the sources, but distance was indicated to be a significant factor only for bulk movements of liquid food products such as vinegar and tomato paste. In support of this view, the regression analysis yielded a breakeven mileage of 1,000 miles even for the conservative (high range) truck cost estimate. Lower truck cost estimates and allowance for service differentials raise the break-even mileage point even higher. The statistical analysis was not sufficiently refined to determine the break-even mileage for the bulk packaged liquid food products.

4. Iron and Steel Products - Manufactured iron and steel products movements are heavily concentrated in the industrial east. The movements are relatively short and the value of the commodities is high. Producers report that they view motor carrier transport as a viable alternative for virtually all their products and use either rail or truck depending on the short run price/service advantage for any given movement. This is substantiated by the statistical analysis which indicates truck competition is viable for movements of up to 900 miles or more.

5. Iron and Steel Scrap - Users of ferrous scrap appear to consider motor carrier service a viable alternative to rail only for movements under 200 miles if the motor carrier obtains a backhaul load. The regression analysis yielded a result substantially above this figure, over 700 miles. Part of this discrepancy may be the result of the weakness of the costing methodologies at shorter distances. It may also result from a failure to allow fully for the cost (and weight penalty) of the special heavy duty truck rigs required for this service.

The five commodity groups discussed above are useful examples of the three general types of commodities and the level of transport competition for them. High density, low value bulk commodities are truck competitive only for very short movements. Of these commodities, only sand and gravel and possibly anthracite coal move regularly in such short movements that truck service is a significant competitive factor, and then only for movements under 50 to 100 miles or less. Higher density, higher value bulk commodities, such as grain, constitute a second major traffic segment. In this case truck transportation plays a significant competitive role for distances of 200 to 300 miles. Beyond that point, motor carrier service would be employed only in relatively exceptional circumstances. Manufactured goods make up the third major traffic segment. The commodities in this category vary greatly in their value, service sensitivity and density. Despite this variation there would appear to be significant motor carrier competition on a direct cost basis for most movements under 300 to 500 miles or more. When service sensitivity is taking into account, such commodities may be truck competitive in movements of 1,000 miles, 1,500 miles or even farther.

(b) Rail Intramodal Competition

As has been mentioned the ability of railroads to set rates collectively obscures the real extent of intramodal competition. The qualitative portion of the research indicated that railroads do compete for traffic they consider "attractive" such as repetitive, high volume, high valued, long haul movements. The actual extent of this real competition cannot be measured with the data available. It is probable that competition of this type is limited considering the relatively small proportion of rail traffic which might be considered "attractive" and which would be accessible to more than one carrier. This is certainly true if competition is defined as the presence of aggressive, independently arrived at pricing.

The measure of intramodal competition employed in this study reflect potential as opposed to actual completion. For many commodity groups, the estimated potentially competitive portion of the traffic is quite high. This is true only to the extent that individual shippers have access to more than one rail carrier either through reciprocal switching and/or routing control or through motor carrier connections. Relatively few shippers are actually served by two or more carriers directly.

If service rather than price competition is is the principal concern of the shipper recent research indicates that the single line carrier will handle the traffic nine times out of ten rather than the joint carrier route[1]. In a deregulated environment, or at least in an environment where collective ratemaking might be less important, pricing strategies could more accurately reflect service differentials. Under such circumstances intramodal competition would become much more significant than at present, possibly approaching the level estimated by the statistical analysis in this study.

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1 Analysis of the Flow of Freight Traffic on the U.S. Rail System for the Year 1974, Final Report June 1978, Princeton University RSPO Contract 77-7016.

allocated costs whichever was higher). There are several reasons for this anomaly. In some instances, the truck costing algorithm was inaccurate and the rail rate is actually less expensive, but the shipper interviews indicated that in fact there is a sizable amount of traffic where motor carrier transport is lower in price than rail. Clearly, then there is a sizable proportion of the traffic which could be diverted to truck but has not been. The reason for this apparent anomaly is the long run nature of physical distribution strategy decisions.

Shippers are continually re-evaluating their physical distribution program, but the individual shipper makes major physical distribution strategy decisions relatively infrequently, e.g., when planning a new plant or developing a major new marketing program. Sometimes such major strategic decisions are not made until a physical distribution management department is created in the firm to absorb the old traffic department and the inventory management function. Once a major change in distribution strategy is made, the firm will be reluctant or unable to alter this basic strategy for a period of years. It is at this time of a major re-evaluation of physical distribution strategy that significant shifts from rail to truck occur. Once this shift has occurred another major reassessment of distribution strategy may be required to reverse it.

Rail pricing strategy decisions on the other hand tend to be shorter range in nature as short run total rail expenses do not vary much with volume. Thus there are short run incentives to price to capture more traffic. The financial problems of some carriers may encourage them to maximize short run cash flow. There is an essential difference between the longer run physical distribution planning horizon and the shorter run rail pricing horizon. This difference must somehow be accomodated by the regulatory process if both shipper protection and adequate rail carrier revenue objectives are to be met.

(e) Shipper Bargaining Power

Measurement of shipper bargaining power using statistical techniques and the rail traffic data base was of limited value. The total volume of traffic identified was small, and the test does not measure the power of shippers in dealing with the carriers. During the qualitative review of rail markets it became clear that for some major commodities shippers do deal with the carriers from a position of strength. This was especially the case for coal, grain mill products, iron ore, and canned

goods. The source of shipper bargaining power was found in intramodal competition, in multiplant capability, in the availability of alternate sources of supply; and in the "attractiveness" of the commodity in terms of rail carrier costs and operations.

(f) Market Dominant Traffic

The preceding analyses indicate the difficulty in precisely determining how much rail traffic is market dominant.[2] The statistical analysis applied tests that attempt to answer this question. A tally of all movements subject to motor carrier competition, rail competition or evidencing downward shifts in rail market share indicated long term alternatives were available in most cases. The results indicate that practically all rail traffic (over 95%) appeared to have some form of current or potential competition. This does not mean there is no market dominant traffic in shorter term time frames.

Limitations in the data base, in the costing procedures, and in the test design have been thoroughly documented in the earlier chapters of this report. Intramodal competition, for example, is more potential than real. It is easier to identify what is probably not market dominant than what is market dominant by empirical analysis. Traffic which is motor carrier competitive is easier to identify than intramodal competitive traffic; consequently, it is easier to determine when one form of competition is present than to determine that all are absent.

On the basis of short run shipper alternatives (not long term market share trends), it is probable that 10-15% of the traffic is market dominant and another 10-15% may be market dominant depending on potential intramodal competition and the value of motor carrier service differentials. While it is difficult to precisely define which movements are market dominant using quantitative techniques, certain individual movements in the data base exhibit market dominant characteristics. The ultimate problem is to accurately characterize and categorize them and to identify where shipper bargaining power is not a factor.

2 Market dominance is the absence of effective competition. This study anlyzes the term "effective competition" in terms of the extent of alternatives available to the shipper to control the total cost of the logistics system through transportation alternatives or other bargaining power elements.

As was indicated earlier in this chapter there is a major difference between the physical distribution strategy time horizon and the rail carrier pricing time horizon. This factor creates conditions of "short run market dominance." It is this condition that is of principal concern to shippers and which must be recognized by a program of time phased changes in the regulatory environment. The exact amount of "short run market dominant" traffic has not been determined empirically as evidenced by attempts to measure "substantial investment" in the earlier Section 202 study.

The empirical analysis therefore confirms the theoretical discussion in the initial chapters of this report e.g., are three categories of traffic: non-market dominant, market dominant and a "gray area". The empirical analysis proved to be much more effective in identifying non-market dominant or gray area traffic than in identifying market dominant traffic. As a result, the gray area traffic appears to be the largest single segment of traffic, at least until intramodal competition can be made more reliable as a competitive device and until its actual functioning can be observed and measured. The implications of these conclusions for designing alternative market dominance procedures are discussed in the next section.

IMPLICATIONS FOR THE DESIGN OF MARKET DOMINANCE PROCEDURES

The characteristics of rail markets and of the competitiveness of rail traffic are the main factors influencing the design of alternative standards and procedures for market dominance. The empirical and statistical analysis results determine how these factors will be applied to the major alternatives discussed below.

(a) Prior Segmentation as a Regulatory Tool

The considerable burden of case-by-case regulatory decisions and the need for speedier, more predictable procedural processes has increased the interest in prior segmentation as a regulatory tool. This technique involves the examination of rail markets and an approach to determine in advance through analytical procedures, what traffic will be considered market dominant or not market dominant initially. There are several possible approaches to prior segmentation.

One approach calls for the prior designation of some groups of traffic as clearly market dominant, i.e., characterized by no intermodal or intramodal competition and no countervailing shipper bargaining power. Another approach examines the other end of the dominance spectrum and would define as non-market dominant any traffic where competitive forces clearly are at work. The latter approach could be structured either on the basis of intermodal competition alone or on the basis of either intermodal or intramodal competition presumed sufficient to limit prices through competitive market forces.

Of these three approaches, the first, prior determination of what traffic is market dominant appears procedurally difficult. The level of detail required to specify all segments of non-competitive traffic spread through many commodities and over a broad range of geographic regions is considerable. Given the complexity of this approach, it is of limited practical value as an a priori approach.

Determining by prior segmentation which is not market dominant is a feasible course of action. Much effort during the course of this study was directed to developing a workable prior segmentation scheme combining the effects of intermodal and intramodal competition for defining non-market dominant traffic. From a statistical standpoint the effort was relatively successful. Traffic segments encompassing roughly a third of all rail tonnage were identified as competitive. The complexity of the segmentation (over 600 distinct categories of traffic were identified by SPC groups, mileage block, weight block, and origin rate territory) and the uncertainties surrounding intramodal competition limits the potential for success of this particular prior segmentation process.

A much more practical and supportable prior segmentation approach is one based entirely on motor carrier competition. For most commodities, the length of haul seems to be the determining factor in identifying the truck competitive portion. Length of haul is relatively easy to determine for a particular movement. Moreover, the information that would be required to support such a prior segmentation is easily obtained in the form of truck cost evidence which can be used to verify the analysis of this study and by using traffic flow data to determine if both rail and truck share the existing traffic.

If a prior segmentation methodology is employed to define a portion of competitive rail traffic as non-market dominant because of effective truck competition, other questions are raised if potentially rail competitive traffic (i.e. with intra-modal competition) is not included. How the remaining competitive segment should be handled from an overall regulatory policy is a significant issue.

If the theoretical discussion at the beginning of this report is correct, there are few reasons not to deregulate truck competitive rail traffic entirely. The only reasonable grounds for regulatory intervention would be in cases of discriminatory rates extracted by shippers from weak carriers as a means of injuring other shippers.

(b) Threshold Tests

Approaches for resolving the market dominance of "gray area" traffic involve the use of so-called threshold tests. These tests would involve a procedure that determines the placement of burden of proof, the evidentiary requirement in a given proceeding, or whether a given rate or protest will be reviewed on a case-by-case basis. The following paragraphs discuss how empirical analysis provides information on the nature and feasibility of four possible threshold tests:

1. Truck Cost Ratio Test - One possible way to identify market dominant traffic in a specific proceeding is to compare the rail rate with the potential cost to the shipper of motor carrier transport. When motor carrier prices are at or below rail rates, motor carrier competition, at least as a form of potential competition, is present. Motor carrier competition is also relevant even when truck rates are above rail, due to the general service superiority of motor carriers. A threshold test based on motor carrier/rail rate comparison must recognize that some truck rates above rail are competitive also.

As indicated by the results presented in Chapter V, the actual ratios between truck and rail for traffic believed to be service sensitive vary considerably among commodities and over various mileage ranges. The national average was approximately 1.5 truck/rail ratio; however, this was distorted somewhat by the exceptionally high ratios (over 2.0) for finished motor vehicles. Many manufactured commodities seemed to cluster around 1.3 as an average, but for nearly every commodity there was a substantial dispersion among movements For length of haul below 500 miles, the ratio was near or below 1.0 for most manufactured commodities; thus, the rail movement of manufactured commodities is generally estimated to be truck competitive under 500 miles.

Alternatives to a single threshold value include variations for mileage, commodity type (density, value, etc.), or perhaps a formula based on price of the commodity or its storage characteristics. None of these alternatives would appear any better than deregulation of major blocks of traffic based on commodity type and distance, since the necessary supporting research is the same in either case and the deregulation approach is both simpler in execution and more sophisticated in the level of supporting analysis which it permits.

2. Market Share Based Tests - Despite the relative acceptance by some shippers and carriers of a single market share test, such tests contain many methodological problems. The difficulty lies with the definition of market. If the market is defined as the traffic of a single shipper or specified group of shippers, determination of market share (either intermodal or intramodal) is relatively easy. If major rate cases are to be decided on the basis of such a test the definition of the market becomes a topic for proceedings and/or litigation. Market share trend analyses may be more useful in a procedural context. The historic rate of change in one shipper's mix of rail and truck shipments may suggest the speed with which that shipper can make an orderly adjustment to increases in rail rates. If a shipper is found to have no short run transportation alternatives for his existing rail movements but has progressively shifted more and more tonnage to truck over the years, developing a phased procedure over time which gives the rail carriers increasing rate freedom reflects the ability of the shipper to adjust.

Estimation of rail market involving large aggregations of traffic are only indicative of the phasing approaches that might be applied. Such tests do not correlate well with tests of short run competitiveness because there are non-transportation alternatives (such as plant relocation or distribution system reconfiguration) influencing such market share shifts as well as simple traffic diversions. Thus short run changes in rail rate freedom probably cannot be justified solely on the basis of market share trends.

3. Revenue/Cost Ratio Test - The revenue/cost ratio test is theoretically one of the best measures of rail market power. Based on the statistical analysis in this study it is one of the poorest. This conclusion recognizes that rail rate structures originally evolved under very different competitive conditions and that there has been systematic regulation of rates since the 19th century. As was mentioned previously in this chapter, high revenue cost ratios (high relative to rail

carrier averages) are more often found for intensely competitive traffic than for non-competitive traffic. To employ a revenue/cost ratio test as a means of identifying market dominant traffic is likely to misclassify a substantial proportion of the movements.

Therefore, the problems with a historical revenue/cost test are related to obsolete rate structures or the rigidities of the pre-1976 regulatory framework. Rail Form A costs do not necessarily indicate the "correct" cost for pricing purposes. Currently, the ICC is developing major revisions of the costing methodology and reviewing the cost of capital assumptions implicit in Rail Form A costing. Revenue/cost ratios to be of value in proceedings resolving issues of market dominance costing procedure must be defined for pricing purposes, i.e., oriented toward the future costs of rail service and the overall investment of the carriers.

There are some long term practical uses of revenue cost ratio tests. As the overall revenue/cost ratio for all movements in the rail traffic data base was determined to be approximately 1.38, the revenue/cost ratio is not an effective indication of competition today. Nevertheless, given adequate research and an improved costing procedure, a revenue cost ratio test might provide an upper bound of reasonablesness of new rates on traffic where rates were previously depressed or where no traffic had previously moved by rail.

4. Maximum Rate Increase Test - As shippers can and do adjust to changes in relative transportation costs, the simplest and most useful type of threshold test would be a maximum rate increase limit. The logic of this test is the inability of a railroad to increase a rate by more than some specified percent if there is transportation competition. Such a threshold need only be set in terms of some modest increase over the rate of increase of rail carrier costs (perhaps 5 to 7 percentage points). If the rate of change of relative transportation is gradual enough to permit shipper adjustment if such an adjustment results in a permanent shift from rail transportation, that is the risk accepted by a railroad for greater pricing flexibility. This approach would give shippers considerable warning regarding trends in their transportation costs thus enabling them to redeploy assets as required.

(c) Adequate Revenue Considerations

An environment of rapidly escalating material costs, costly labor agreements, intensive motor carrier competition, and public transportation investments in other modes, limits the power of the Commission to assure the rail carriers an adequate return on their historical net investment base. In the narrower context of market dominance, the Commission can recognize potential impact of any procedures on revenue adequacy and should structure these procedures in a manner consistent with the obligation to assist the carriers in obtaining adequate revenue levels. Consideration of adequate revenue levels is an essential component in setting rates on market dominant traffic. Sound costing must be the basis for such maximum rate settings and should consider the full economic costs of providing the service.

The statistical analysis of unstable traffic and the review of cases and examination of the rail marketplace would suggest that prediction of volume and revenues may prove difficult for some market dominance cases. The inability to forecast the long term costs of the service will frustrate any Commission efforts to set a maximum reasonable rate for unstable traffic that considers the revenue needs of the carriers. Some explicit procedural recognition of this condition must be provided. There are several possibilities. One is to set a reasonable maximum rate only if the parties incorporate it into a contract rate specifying volume levels and other factors. Another approach might be to set a maximum rate but relieve the carrier of full common carrier obligation or impose common carrier obligation for some base load of traffic.

Beyond the concerns adequate revenue there is a complex interaction between the market dominance implementation procedure and the ability of the rail carriers to improve their earnings. Because the traffic that formerly provided the source of rail profits for much cross-subsidization (i.e., the high valued commodities) is now truck competitive, low valued commodities cannot be relied upon as the source of the profits required to pay for uneconomical branch lines, non-compensatory traffic, or unprofitable "socially desirable" services. Any implementation of market dominance provision should be coupled with increased rail carrier freedom to terminate unprofitable services or to raise rates to compensatory levels. The procedures should therefore be constructed to minimize or eliminate non-compensatory rates and to prevent individual rail carriers with short run cash needs from driving rates below non-compensatory levels thereby underwriting the revenue needs of the system as a whole.

(d) Adjustment Time Allowances

The initial chapters of this report suggested that an adjustment period is necessary for shippers who made investments in reliance upon the previous regulatory environment and are now facing significant changes in rates of service. Nothing in the empirical analysis contradicts this concern. The empirical analysis demonstrates the need for an adjustment period to the carriers as well.

Many railroads are precariously positioned in many of their most profitable markets. To retain or expand that position requires aggressive marketing and imaginative new service and pricing packages. At the same time many carriers are becoming increasingly oriented to the movement of high volume bulk traffic where service is less important. Increased pricing freedom will compel the railroads to make vital strategic decisions regarding the type of service they can and want to provide and regarding the traffic mix that can be most profitable.

The experience of the air freight industry suggests that such decisions are not made easily if an industry is deregulated suddenly. Unlike the air carriers, most railroads have little or no profit margins to cushion any difficult adjustment period nor do they always have other extensive lines of business as a source of short run cash. If new market dominance standards and procedures are an element of a framework for re-regulations, they should contain elements of time phasing to permit both carriers and shippers time to prepare adequately. Such phasing must be carefully planned and known to all parties in advance. Gradual implementation of deregulation on an unannounced schedule is not a substitute for a well thought out, long range, publicly available program. Such a program is also superior to a rigid program of deregulation that is statutorily imposed and lacks the flexibility to accommodate the needs of shippers or carriers lacking the protection of market forces.

(e) Shipper Bargaining Power and Contract Rates

One of the disappointments in the empirical analysis was the inability to develop an unambiguous test for shipper bargaining power. That it exists is unmistakable from the industry analysis. The concept builds on the presence of intermodal and intramodal competition but extends their effects beyond the narrow geographic definition employed in this study.

The concept of market dominant traffic is of little or no relevance in the automotive and other industries where producers are enormous, multi-plant companies whose transportation expenditures may exceed $100 million annually. Traditional approaches to regulatory design are inadequate to deal explicitly with this situation. Relationships between these very large shippers and the rail carriers are presently based on negotiation and the existing regulatory framework for most rail pricing is virtually irrelevant. Recent Commission actions have increased the probability these arrangements will be formalized. Contracts entered by mutual agreement should be considered prima facie evidence of effective competition and should not be reviewed for reasonableness unless undue discrimination is clearly present.

(f) Interstate Versus Intrastate Jurisdiction

If alternative market dominance procedures are to afford greater pricing freedom for the railroads, the role of the state regulatory commissions must be carefully examined. Much of the competitive or potentially competitive rail traffic moves on intrastate rates as indicated by the data in Chapter V. A large amount of this traffic is also non-compensatory at Rail Form A variable cost level. There is no way to deal explicitly with intrastate traffic in a simple revision of the market dominance implementation procedure. Since much of the potential effect of a new procedure might be lost because of the ability of state regulatory commissions to delay rate changes, legislative changes in the relationship between the state commissions and the Commission may be appropriate.

SUMMARY AND CONCLUSIONS

The following paragraphs constitute a brief summation of the principal points made in this chapter:

- Rail markets are extremely complex. Any procedural design which applies general rules to rail traffic should provide for equitable treatment of exceptional cases.

- Intermodal competition from motor carriers and barge operators affects a large share of rail traffic. Depending upon the assumptions employed, it is estimated that from 30% to 50% of all rail traffic is motor carrier competitive. This competitive traffic is primarily very short haul movements of bulk commodities (50 to 200 miles) and short to medium haul movements of manufactured goods (up to 500-700 miles or more).

- Intramodal competition is potentially quite significant; however its present role in protecting shippers is limited currently by the ability to set rail rates collectively.

- Vestiges of the old value of service based rate structure result in higher revenue/cost ratios on competitive than on non-competitive traffic. This negates the value of the revenue/cost level as a test for market dominance.

- The precise extent of market dominant traffic is difficult to determine. If all forms of transportation alternatives are considered together with long term adjustments by shippers, very little (under 5%) of the traffic would be considered market dominant. However, short term effects and the limited effectiveness of intramodal competition indicate that 10% to 15% of the rail traffic appears to be market dominant and a substantial portion was found to be of a mixed competitive nature.

- Prior segmentation may be a useful tool for implementing the market dominance provision. However, its best application might be as a guideline for deregulating the component of rail traffic which is competitive with motor carriage.

- None of the frequently discussed threshold tests that might be used in a market dominance procedure, are fully satisfactory. A market share trend test, revenue/cost ratio test and maximum rate increase test may be useful under some limited circumstances.

- While adequate revenue for the rail carriers cannot be assured by direct Commission action, the Commission has an obligation to permit adequate profit levels on market dominant traffic and to encourage the elimination of non-compensatory rates.

- Carriers and shippers will both require an adjustment process to adapt to an environment of greater ratemaking freedom.

- Recognition of shipper bargaining power should be built into procedural design. This may be achieved by defining contract rates as presumptively non-market dominant and by permitting carriers to present indicia of shipper bargaining power as additional evidence of shipper alternatives.

- Expanded ratemaking freedom cannot be fully achieved even with a liberal definition of the market dominance provision unless there is explicit legislative treatment of the role of state regulatory commissions.

VIII - PROCEDURAL ISSUES AND ALTERNATIVES

This chapter explores alternative procedures and methods for determining the presence or absence of market dominance and contains examples of alternative standards and procedures which appear reasonable in view of the conclusions of this study. The discussion in the first section of this chapter provides the conceptual framework involved in increasing rail ratemaking freedom while assuring protection to the shipper from abuses of market power. The procedural examples will illustrate how these issues can be translated into practical approaches to implementing the market dominance concept.

The chapter contains the following major sections:

- Purpose and Background of Procedural Analysis
- Objectives of Procedural Design
- Strategic Considerations in Procedural Design
- Basic Elements of Procedural Design
- Procedural Design and its Correlation with the Empirical Analysis
- Alternative Procedural Designs
- Summary

PURPOSE AND BACKGROUND OF PROCEDURAL ANALYSIS

The present standards and procedures for determining market dominance were analyzed to gain insight into problems that might arise in implementating any new market dominance standards and procedures. The present procedures are based on three presumptive tests of market dominance. market share, rail revenue/cost ratios, and substantial shipper investment. The following tasks were undertaken in performing the procedural analysis:

It is important to note that the possibility of protest with the resulting investigation and/or suspension is more a threat than a reality. With few protests being filed and even fewer leading to an investigation, the carriers may well be over-reacting to the prospects of Commission action.

In discussing the present presumptive tests, carriers stated that the traffic share test could be acceptable if modified, although they indicated that in some cases it may be difficult to develop the data. The carriers would prefer to have a higher percentage figure than the present 70 percent. The main point of disagreement, however, centers around the definition of the market used to compute the traffic share. Private carriage is considered to be one of the railroads' most significant competitors. If so, it should be included in the relevant market. It was also indicated that the test should take into account potential as well as actual competition.

The cost test was generally viewed as an invalid measure of a carrier's market power. For example, a carrier could well be a minor factor in a market with the actual level of rates being controlled by a competitor(s). A more accurate measure might be achieved by combining the cost test with a traffic share test. Even this measure is not satisfactory to all carriers and some carriers would like to see the cost test eliminated. The cost test was also criticized as being expensive and unreliable in determining a carrier's actual or prospective cost of performing the service. Attempts to identify the level of expense in preparing a cost case by a carrier proved to be unsuccessful.

In contrast to shippers, the carriers disliked the substantial investment test. They stated that the concept was too ambiguous to be practical. They contended that the test creates uncertainty because there are no standards against which the Commission may determine what constitutes substantial investment. Such uncertainty does not encourage rate innovations.

As with the shippers, it should be pointed out that the carriers were most likely viewing market dominance in the context of "traditional" Commission regulations and procedures. Their views could also change as they gain more experience with the marketing impacts from evolving rail regulatory policies and procedures.

OBJECTIVES OF PROCEDURAL DESIGN

A set of regulatory objectives were developed to assist in formulating new procedures for implementing the market dominance provision. The basis for these regulatory objectives rests upon an analysis of the present procedures, discussions with shippers and carriers, and guidance from the Commission staff. The six objectives are as follows:

- Approaches and evidentiary requirements should be easily understood by all affected parties.
- Any data required should be readily available to all parties.
- The cost of securing, developing, and presenting the data should be kept to a minimum.
- Maximum rail prices should be deregulated where the market system's competitive forces can control the maximum rail price.
- Shipper protection must be available when the market system's competitive forces cannot control the maximum price.
- Commission involvement should be minimized except where public interest indicates that involvement is essential.

Any definition of market dominance cannot be expected to satisfy all these objectives equally. Any method for determining the portion of rail traffic that is subject to competition should be both accurate (in that it provides a theoretically and empirically precise finding of market dominance in each case) and easily verified by all parties. Practical definitions of market dominance represent a compromise of competing objectives. The overall purpose of redefining standards and procedures for market dominance is to suggest changes in procedures and practices that would, on the one hand, provide rail carriers with greater pricing flexibility supporting more adequate revenues and, on the other hand, provide shippers with some form of protection from potential market abuse by rail carriers.

STRATEGIC CONSIDERATION IN PROCEDURAL DESIGN

The results of the empirical analysis, the review of the present market dominance procedures, and the theoretical issues discussed in Chapters II and III must be integrated with the procedural design objectives. There are literally hundreds of possible combinations of threshold test, segmentation, evidentiary requirements and so forth which might be feasible as the basis of a procedure for identifying market dominance and processing rate cases accordingly. The purpose of this discussion is to show how various procedural design elements interrelate based on what has been learned about the transportation and competitive characteristics of rail traffic.

In the next subsection there is a brief review of how specific market dominance procedures can serve the objective of greater ratemaking freedom for the railroads. Following that is a subsection dealing with levels of ratemaking flexibility and how various options related to the selection of overall procedural design strategies. The final section of this chapter outlines some approaches to the design of market dominance standards and procedures which appear to be the most interesting alternatives from the perspective of the project study design.

(a) Ratemaking Freedom Versus Shipper Protection

If it were possible to determine exactly which movements are competitive and which are not, and if this knowledge were obtain at little expense, then achievement of both shipper protection and rail carrier pricing freedom would be a relatively easy task. Unfortunately, this knowledge is both limited and expensive. There are therefore three basic strategies for dealing with the identification of competitive traffic. These strategies - prior segmentation, rebuttable presumptions (joint tests), and threshold tests - are discussed in the following paragraphs. All have been discussed previously in this study. Here they will be explicitly related to the objectives for new market dominance procedures.

1. Prior Segmentation. The most direct way of expanding rail ratemaking freedom is by prior segmentation of non-market dominant traffic (the only feasible form, given current data limitation and costs). If this segmentation is based on motor carrier competition break-even points for major commodity groups, the process is easily understood, a reasonable level of shipper protection is provided in the competitive sector, and the burden for data gathering and analysis is placed on the Commission.

At the same time there are limitations to the approach. If the segmentation is applied with sufficient caution to minimize misclassification of non-competitive traffic, sizable percentage of competitive traffic are likely to be excluded. Also, intramodal competitition is ignored by this approach to prior segmentation, making the amount of competitive traffic classified as potentially market dominant even greater.

If prior segmentation is employed, the procedures for dealing with the remaining traffic must reflect the indeterminate status of much of it. This calls for some additional test for this traffic or for a more stringent evidentiary requirement for rate protests. The actual level of ratemaking flexibility allowed on this traffic would be higher the more refined a given strategy becomes.

2. Rebuttable Presumption. The fundamental criticism of the existing rebuttable presumptions is that at least one of them is likely to be present on a very high percentage of movements. While this contention is not fully supported by Kearney's earlier study of market dominance, it would appear that this belief has deterred some carriers from more aggressively utilizing their potential ratemaking freedom. This situation can rather easily be altered by imposing a rebuttable presumption test that would require shippers to show that rail carrier market share is high and that rates are above some threshold revenue cost ratio. In effect this achieves expanded rail ratemaking freedom by making rate protests difficult and costly.

This strategy has several weaknesses. If the presumptions are made sufficiently stringent that rail carriers have considerably increased pricing freedom, the burden is likely to fall hardest on smaller shippers who do not have the knowledge or resources to develop elaborate cost and market share data. On the other hand if the presumptions are made simple enough for small shippers to deal with economically, the result may resemble today's stalemate where shippers file few protests, out of ignorance and uncertainty, and the railroads file relatively few rate actions due to fear of shipper protest.

The fundamental problem of the rebuttable presumption approach in determining the presence or absence of market dominance is that any such presumptions must be a joint tests (i.e., no rail competition, no truck competition, and maybe high revenue/cost ratio) to be theoretically correct and to yield accurate classification. Such a joint test requires substantial data and cost evidence, information which may be expensive or unavoidable to the parties in the case. This problem could be circumvented either by an expanded program of assistance to smaller shipper in developing rate protest or by reserving the rebuttable presumption only for instances of extreme shippers abuse.

One way to make a rebuttable presumption strategy more useful in a market dominance determination would be to have a split burden of proof. In such a procedure, a shipper might file a protest with evidence regarding only the alternative mode costs and the rail carrier traffic share. The carrier would have the burden of proof to show that the revenue/cost ratio ws not above a specified level. If the rate was above that threshold, the carrier could still present evidence in rebuttal of the shipper's truck cost and traffic share data. Split burden of proof may not be feasible under current procedures. If so, consideration might be given to changes in the Act to permit this approach if the Commission ultimately found it most desirable.

3. Threshold Tests. The practical limitations of individual tests in distinguishing simply between competitive and non-competitive traffic are documented in Chapters V and VII. They do have appeal in that simple comparisons between truck rates and rail rates or narrowly defined traffic share ratios may be relatively easy to develop, especially for shippers. Such a threshold test might indicate to a shipper the potential success of a protest, with a minimum of data cost. Unfortunately, these tests are by far the least reliable and make sense only within a procedural design where the principal identification of market dominant or non-market dominant traffic is accomplished through other means.

(b) Level of Ratemaking Flexibility

The characterization of a segment of traffic as rail dominant or competiting does not automatically suggest a specific approach for rate regulation. Non-market dominant traffic by law is exempt from maximum rate regulation. The Commission may also choose to increase ratemaking freedom for

this traffic still more by elimination of minimum rate regulation or even by complete deregulation. The choice of approaches is entirely dependent on the reliability of the segmentation procedure and any additional classification procedures or appeals used to supplement it.

In other words, a carefully researched prior segmentation may permit sufficient confidence to justify a well defined degree of deregulation. A rebuttable presumption program, in comparison, is sufficiently unreliable to require retention of such controls as common carrier obligation and the anti-discrimination clause.

The selection of a strategy for rate regulation on traffic not found to be explicitly competitive is more complex. For one thing there is a fairly broad range of options. Some typical alternatives are listed below:

1. Five-Year Tariff Plan. The time phasing of changed rate relationships might be encouraged by authorizing the carriers to file five-year tariff rate increase plans for market dominant or indeterminate traffic. Such a plan would specify a percent rate increase in addition to the rail carrier cost index for each of five years and be justified by recoupment of additional cost levels required to provide particular services and investments. The carrier might not be bound to the plan except for the rate ceiling established for the period. Any rate in excess of the upper limits in the plan would be subject to case-by-case review. Once the rate plan was reviewed and approved by the Commission, rates within the scope of the plan would not be subject to protest, investigation or suspension. This approach would permit shippers to know what their long run logistic options would be while at the same time providing carriers opportunities to market improved service "package" at significantly higher rates where this was in their interest.

2. Zone of Reasonableness. In order to provide carriers a degree of ratemaking flexibility on indeterminate or market dominant traffic, an upper and lower bound for rate changes might be established annually by the Commission. The size of the range would depend in part on the rate of inflation the amount of experience with more flexible rail ratemaking, and the Commission's policy positions on general rate increases and adequate revenue levels. Such a zone could function as a threshold test for rate increases so as to permit the carriers increases beyond the zone if either non-market dominances or just and reasonableness were found in a case-by-case handling of the increase.

3. Contract Rates. The encouragement by the Commission of contract ratemaking will promote ratemaking flexibility even on some traffic which might otherwise be designated market dominant. If contract rates are declared nonmarket dominant *prima facie*, then any carrier would have the opportunity for determining maximum rates without regulatory review by bargaining in good faith with shippers to establish a contract rate.

(c) Dealing With Market Complexity

The empirical analysis in this study proved that the rail transportation marketplace is extremely complex. In dealing with this complexity policymakers must satisfy objectives, which are potentially in conflict. The objectives of the parties external to the Commission, shippers and railroads, are different in their commercial concerns and time horizons (i.e., short run rail pricing motives versus long run physical distribution concerns).

The discussion in this subsection suggests that no single approach to market dominance implementation will be fully satisfactory. The complexity of the rail transportation market requires the elements for any alternative standards or procedures for market dominance be assembled in a logical, functionally compatible form and integrated carefully with a total program of rail regulatory reform. Such a program approach, though more complex when viewed from the perspective of the individual shipper or rail carrier executive, may be preferable to a conceptually simple procedure which is highly ambiguous in its scope, coverage, and operation because all parties are informed of their positions in advance on a range of regulatory issues including market dominance. The integrated framework also provides a flexible device by which the Commission can more readily modify its regulatory practices based on experience. These points are illustrated by four examples in the following subsection.

ILLUSTRATION OF PROCEDURAL APPROACHES

The four procedural examples presented in this section illustrate that progressively more sophisticated approaches to market dominance yields progressively more satisfactory results for achieving the public policy objectives of regulation. Each

example is first described operationally and then evaluated in terms of its ability to achieve each of five major objectives which embrace the full range of objectives discussed earlier in this report. The fourth example is most interesting as it represents a typical program approach to market dominance implementation. Market dominance is presented in its appropriate perspective as one component of a total program for achieving regulatory objectives.

(a) Example 1: Rebuttable Presumptions, Current Standards and Procedures

The current standards and procedures apply a set of presumptive tests to the finding of market dominance. If a shipper presents adequate evidence that any one presumption is true, the Commission may decide to review the case on its merits. If market dominance is not found, the rate increase is presumed to be just and reasonable. This approach has not contributed significantly to achievement of most policy objectives for the reasons discussed below:

1. Shipper Protection - This approach has had the paradoxical effect of protecting some shippers unncessarily and failing to protect those who may need protection most. Since a fairly high percentage of all traffic may pass at least one test, sophisticated shippers can protect themselves by alleging market dominance even where there are competitive alternatives available. Small, less knowledgable shippers find the data gathering requirements difficult and the procedures confusing. The current rebuttable presumptions therefore possess the common failing of any such procedure in that it is not precisely clear who is protected and whether the protection is provided where needed. Protection of shippers may have resulted because rail carriers have persisted in relying heavily on general rate increases rather than individual rate actions due to the perceived institutional costs of litigating controversial rate changes under the current presumptive tests.

2. Rail Ratemaking Flexibility - Irregardless of the potential for ratemaking flexibility under the present procedures, the carriers have not made use of it. Had they done so the present procedures might have been much less effective in protecting shippers. Whatever the underlying cause of the limited use of this rate flexibility a flexible rate program is meaningless if railroad managers cannot or will not use it.

3. Simplicity and Practicality - This approach is conceptually among the simplest possible as three brief rules are the basis of the methodology for segmenting market dominant from non-market dominant traffic. Problems arise, however, when those innocuous rules are applied in a real-world, case-by-case environment where problems of interpretation and the availability of data create high levels of uncertainty and ambiguity. These are practical weaknesses that have been a significant factor in the limited ability of the existing rebuttable presumptive test design to achieve integrated regulatory objectives.

4. Achievement of Adequate Revenue - The revenue improvements desirable under a flexible pricing system include timely recovery of inflationary cost increases and development of profitable new rate/service packages. These have not been obtained under the current tests. The total impact on rail revenue by selective rate increases has not been significant and the potential litigating burden imposed by the existing presumptions is a probable cause.

5. Minimization of Regulatory Involvement - Rebuttable presumptions are only applied in a case-by-case environment. The case by case approach for shipper protection requires a fairly high level of continued regulatory involvement. The principle achievement of the existing rebuttable presumption approach has been shipper protection. If the regulatory objective of greater ratemaking flexibility had been pursued by more aggressive use of selective rate actions the shipper protection objective might have suffered also. Thus it would seem that achievement of most regulatory objectives may be difficult or impossible with this regulatory design. The conceptual theoretical and practical weaknesses of the existing rebuttable presumptions were explained in detail in Chapter VII.

(b) Example 2: Rebuttable Presumption, Modified Standards and Procedures

One possible improvement to the existing rebuttable presumptions is to revise the tests by requiring more than one test to be satisfied before a finding of market dominance. For example the shipper alleging market dominance in a rate protest might be required to establish that motor carrier competition was not available, that the rail carrier enjoyed a dominant share of the rail market, and that the revenue cost ratio was higher than some threshold. This design is consistent with the theory that the presence (and therefore evidence) of competition in the marketplace is adequate to protect a shipper's interests. This design also cannot simultaneously satisfy all key regulatory objectives:

1. Shipper Protection - Since the evidence required of shippers in this illustration exceeds that currently required, it is probable that even more shippers would find the data requirements onerous and confusing. Combining presumptive tests would diminish the ability of larger, sophisticated shippers to allege and litigate market dominances where none exists; however, an even greater number of small shippers would lose protection. The overprotection of large shippers would be thereby eliminated, but underprotection of small shippers would be aggravated. A further complication is that the individual presumptive tests described are known to have serious methodological weaknesses in determining market dominance (especially the intramodal competition test and the revenue/cost rates test). Shipper protection is only as reliable as these tests themselves.

2. Rail Ratemaking Flexibility - There would be a definite increase in flexibility of rail pricing. However, some "gray" areas of traffic (primarily that of large shippers) would still present problems because of the risk of shipper protest and the cost of case-by-case defense of selective rate increases without a previous consideration of the transportation characteristics of the traffic. Individual findings on the record would still be required.

3. Simplicity and Practicality - Like all presumptive test designs, the concept is simple, but the application complex because of case-by-case litigation. For the shippers to prove the absence of intramodal competition may be very difficult unless the railroad rate bureaus are completely eliminated and rigid barriers erected to prevent covert collective ratemaking. This approach is therefore more complex and has more practical problems than the existing presumptive approaches. These might be reduced if the burden of proof for different elements of the combined test were placed on different parties. However, this modification could result in other administrative problems.

4. Achievement of Adequate Revenue - To the extent that ratemaking flexibility is enhanced this regulatory procedure may result in increased rail carrier revenues. However, as was earlier explained the source of revenue increases is of equal importance as the level of the increase as some sources, such as lower valued bulk commodities may respond through long run adjustments and result in long run declining markets for rail carriers. Adequate revenue for the rail carriers is a meaningful regulatory objective only if the carriers are assured an internally consistent regulatory environment that encourages rational decisionmaking. This requires ratemaking flexibility for new service/

rate packages, ability to withdraw assets from unprofitable or marginally profitable services, and maximum rates on regulated traffic that recover their full economic costs. There is no reason to believe that the uncertainties of the case-by-case approach and litigious battles between carriers and shippers inherent in the rebuttable presumptive approach will achieve these overall regulatory objectives.

5. Minimization of Regulatory Involvement - This approach, like the first, relies primarily on case-by-case review of protests to identify market dominant traffic. Continuous regulatory involvement at a high level of detail would be required.

In general, this regulatory design, though somewhat improved in comparison to the first illustration, is also unable to satisfy most objectives well.

(c) Example 3: Prior Segmentation Plus Rebuttable Presumption

An additional refinement to the second rebuttable presumption example may be achieved by utilizing a prior segmentation to determine that motor carrier competitive traffic is non-market dominant. The rebuttable presumptions procedure would apply to the remainder of the traffic, which would include some competitive and non-competitive traffic. The empirical analysis indicates that at least 25% to 35% of rail traffic might reasonably be included in a prior segmentation of truck competitive non-market dominant traffic. Thus, 65% to 75% of the traffic would be impacted by the presumptive tests in this procedural approach. The impact of this change on achievement of the objectives is as follows:

1. Shipper Protection - A reasonably rigorous prior segmentation process would protect the interests of shippers because of transportation competition in the non-market dominant sector. Even with total deregulation of this traffic, shipper protection probably would not be impaired. To the extent that a smaller traffic base would be covered by the rebuttable presumption procedures, regulatory resources could be concentrated somewhat more productively. However, this segment would contain a much higher proportion of non-competitive traffic. The uncertainties in achieving shipper protection by rebuttable presumption may be exaggerated. If the presumptions are relaxed to promote greater shipper protection, a situation may result where

different approach and demonstrates how regulatory tools can be creatively combined to achieve the public policy objectives.

(d) Example 4: Regulatory Program Approach

This example constitutes one reasonable approach to building a rail regulatory framework which includes several procedural elements addressing the issue of market dominance. The design is intended to recognize the complexity of rail markets and the differing needs of shippers and rail carriers. The following paragraphs describe its principal features:

1. Prior Segmentation/Deregulation - The motor carrier competitive portion of rail traffic would be completely deregulated except for rules against certain anti-competitive practices involving collusion and discrimination among carriers and shippers.

2. Zone of Reasonableness/Threshold Test - The railroads would be allowed to adjust rates within a previously determined zone without further procedural review. The upper limit of this zone would be set annually based on all or part of the forecasted inflation levels for the following year. Actual percentage values might be at or somewhat below the full anticipated inflation rate by 1 or 2 percentage points as an incentive to increase yields on marginal or noncompensatory traffic.

3. Contract Rates - In recognition of shipper bargaining power, contract rates would be presumed non-market dominant and not subject to Commission review except upon reasonably supported allegations of discrimination that the railroads were not offering the same contracts to shippers in similar circumstances.

4. Additional Rate Flexibility - Railroads would be allowed to raise rates by a percentage in excess of the ceiling under any one of three conditions. First, if they presented sufficient evidence based on rebuttable presumptive tests and other facts of the case that the traffic was not market dominant, the rates could be raised without further Commission action. Such traffic might thereafter be deregulated. Second, rates could be raised in excess of the ceiling on the grounds the rates were non-compensatory. Third, if present or future traffic does not cover full economic costs, the carriers would be encouraged to file a three to five-year tariff in which the rate of increase and a maximum ceiling would be described in advance. Such tariff proposals would be judged on their merits

by: (1) the ability of the shipper to adjust and (2) the adequate revenue needs of the carrier. In general, the time over which increases would be spread to achieve adequate revenue levels would not be extended by the Commission beyond five years. Once approved, such tariffs would not be subject to regulatory review again unless agreed to by the interested parties.

5. Seasonal Rates - Special procedures would be established for seasonal traffic. This study has not yet addressed the seasonal rate question in detail. One alternative being considered would be a tariff with a pre-specified rate ceiling and floor with a short notice provision for publication.

6. Unstable Traffic - If the volumes of traffic of a particular commodity fluctuates in a highly unpredictable fashion exceeding a threshold test of variable demand, the Commission would relinquish jurisdiction over that portion of the traffic in excess of some predetermined base load.

7. Market Dominant Procedures - Allegations of market dominance (or non-market dominance) would be considered by the Commission only in the case of rate increases above the zone of reasonableness. Where such increases were justified on cost grounds (full economic cost), the only effect might be an order spreading the increase over an adjustment period. (Such increases would be in addition to, not in lieu of, the annual increase allowed by the zone of reasonableness.) Railroads which established a case for non-market dominance would eliminate the Commission's maximum rate regulation over the traffic in question. The upper limit of the zone of reasonableness would constitute the threshold test for invoking market dominance, thus sharply reducing the number of rate changes that would have to be reviewed. The use of additional threshold tests based on adequate revenue considerations would reduce the number of protests even further.

A program of this nature has considerable potential for satisfying the regulatory policy objectives as described below:

1. Shipper Protection - Protection for shippers is now provided specifically in three ways. First, the action of the marketplace provides protection for the truck competitive or deregulated traffic. Second, for much of the remaining traffic where rates reflect actual economic costs, the upper limit of the zone of reasonableness provides shipper with a guideline for budgeting transportation expenditures for the upcoming year. Third, where rate increases in excess of the ceiling are proposed

different approach and demonstrates how regulatory tools can be creatively combined to achieve the public policy objectives.

(d) Example 4: Regulatory Program Approach

This example constitutes one reasonable approach to building a rail regulatory framework which includes several procedural elements addressing the issue of market dominance. The design is intended to recognize the complexity of rail markets and the differing needs of shippers and rail carriers. The following paragraphs describe its principal features:

1. Prior Segmentation/Deregulation - The motor carrier competitive portion of rail traffic would be completely deregulated except for rules against certain anti-competitive practices involving collusion and discrimination among carriers and shippers.

2. Zone of Reasonableness/Threshold Test - The railroads would be allowed to adjust rates within a previously determined zone without further procedural review. The upper limit of this zone would be set annually based on all or part of the forecasted inflation levels for the following year. Actual percentage values might be at or somewhat below the full anticipated inflation rate by 1 or 2 percentage points as an incentive to increase yields on marginal or noncompensatory traffic.

3. Contract Rates - In recognition of shipper bargaining power, contract rates would be presumed non-market dominant and not subject to Commission review except upon reasonably supported allegations of discrimination that the railroads were not offering the same contracts to shippers in similar circumstances.

4. Additional Rate Flexibility - Railroads would be allowed to raise rates by a percentage in excess of the ceiling under any one of three conditions. First, if they presented sufficient evidence based on rebuttable presumptive tests and other facts of the case that the traffic was not market dominant, the rates could be raised without further Commission action. Such traffic might thereafter be deregulated. Second, rates could be raised in excess of the ceiling on the grounds the rates were non-compensatory. Third, if present or future traffic does not cover full economic costs, the carriers would be encouraged to file a three to five-year tariff in which the rate of increase and a maximum ceiling would be described in advance. Such tariff proposals would be judged on their merits

by: (1) the ability of the shipper to adjust and (2) the adequate revenue needs of the carrier. In general, the time over which increases would be spread to achieve adequate revenue levels would not be extended by the Commission beyond five years. Once approved, such tariffs would not be subject to regulatory review again unless agreed to by the interested parties.

5. Seasonal Rates - Special procedures would be established for seasonal traffic. This study has not yet addressed the seasonal rate question in detail. One alternative being considered would be a tariff with a pre-specified rate ceiling and floor with a short notice provision for publication.

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7. Market Dominant Procedures - Allegations of market dominance (or non-market dominance) would be considered by the Commission only in the case of rate increases above the zone of reasonableness. Where such increases were justified on cost grounds (full economic cost), the only effect might be an order spreading the increase over an adjustment period. (Such increases would be in addition to, not in lieu of, the annual increase allowed by the zone of reasonableness.) Railroads which established a case for non-market dominance would eliminate the Commission's maximum rate regulation over the traffic in question. The upper limit of the zone of reasonableness would constitute the threshold test for invoking market dominance, thus sharply reducing the number of rate changes that would have to be reviewed. The use of additional threshold tests based on adequate revenue considerations would reduce the number of protests even further.

A program of this nature has considerable potential for satisfying the regulatory policy objectives as described below:

1. Shipper Protection - Protection for shippers is now provided specifically in three ways. First, the action of the marketplace provides protection for the truck competitive or deregulated traffic. Second, for much of the remaining traffic where rates reflect actual economic costs, the upper limit of the zone of reasonableness provides shipper with a guideline for budgeting transportation expenditures for the upcoming year. Third, where rate increases in excess of the ceiling are proposed

to bring rates into line with full economic costs, the Commission would have the power to extend the impact of those increases over a three to five year period to assist shipper adjustment. Since the overwhelming majority of ratemaking changes would be excluded from detailed review, Commission resources would be devoted to the cases where shipper protection was a serious issue. An agency program of assistance to small shippers in those cases would be a logical adjunct to this process.

2. Rail Ratemaking Flexibility - In addition to the flexibility provided on non-market dominant and deregulated traffic, the zone of reasonableness permits the carriers flexibility even on traffic which may be non-competitive. By announcing the zone of reasonableness percentages at the end of each year for the upcoming year, the Commission provides the carriers a basis of recovering inflationary cost increases without the delays associated with blanket rate increases. By eliminating a very large percentage of the current procedure costs to carriers, this approach permits carriers to redirect their marketing and pricing resources to more productive activities. This naturally includes a critical look at possible noncompensatory services and the development of long term (3-5 year) tariffs for implementing more profitable price and service packages.

3. Simplicity and Practicality - There will always be some irreducible minimum amount of traffic that requires a thorough procedural review. Under this approach that amount of traffic represents perhaps less than 20-30% of the total. Even on this portion of the traffic, shipper protection is achieved by phased implementation of full economic cost-based rates rather than by reliance on complicated arguments of the parties and based on evidence of dubious validity on the presence or absence of competition.

4. Achievement of Adequate Revenues - The long run achievement of adequate rail revenues requires the removal of current institutional barriers and substantial improvements in efficiency. The program of ratemaking flexibility recommended in this example removes most unnecessary barriers to improved carrier revenues while maintaining a solid level of shipper protection. Nevertheless, the carrier cannot expect to rely on this or any other regulatory reform program to eliminate the need for streamlined physical plant, improved labor productivity, and more creative marketing of rail services. It is for this reason that the upper limit for the zone of reasonableness should probably be set at or somewhat below the actual level of anticipated cost inflation as an incentive to improvements in these areas.

5. <u>Minimization of Regulatory Involvement</u> - Under this program the Commission would have three primary functions. First, the Commission would develop the prior segmentation of motor carrier competitive rail traffic and make periodic adjustments as cost and service relationships change over time. Second, the Commission would have an ongoing responsibility to monitor rail carrier cost trends and cash flow generation. This information would constitute the basis of the annual setting of the zone of reasonableness and any midyear adjustments required by unanticipated fluctuation in inflation levels. Finally, the Commission would retain its review function over rate increases above the zone of reasonableness. The Commission's caseload would gradually decline as more and more three to five year tariffs became effective and not subject to Commission review until expiration. The regulatory involvement would thereby be confined to those areas which bear on adequate revenue levels and shipper protection and which require the more sophisticated analyses.

There are several observations that should be made regarding this programmatic approach to regulatory reform. For one thing, the overall satisfaction of the major regulatory objectives is much greater than that of simplistic approaches focused on market dominance in isolation. The most productive method of handling market dominance is within the fabric of the whole regulatory program and there are numerous other elements of regulatory reform which are almost essential to the program described. These include relaxed exit from unprofitable services and geographic markets, restrictions on the role of railroad rate bureaus, revised and simplified procedures for peak and seasonal rates, and further refinement of the Rail Form A costing methodology to reflect present and future costs of specified services.

A key feature of the programmatic approach is its dynamism. One factor in this is the deregulation of a large segment of the traffic. Another is the potential for a gradual shift of traffic toward less regulation. A principal mechanism for this is contract rates since shippers and carriers could avoid most of the regulatory process by entering into a contract. Contract rates should be recognized as the logical way of sharing the risks of innovative service/rate combinations and of formalizing the agreements common today between carriers and major shippers. As contract rates become more widespread, more traffic is withdrawn from most of the regulated sector.

Another factor in this dynamism is the explicit provision for bringing uneconomic rates up to profitable levels. Once that point is achieved during the transition period, carriers

and shippers could either agree to a contract or accept the annual ceiling price increase. Either way, the general tendency will be for traffic to move away from intensive regulation. Similarly, as intramodal competition is encouraged by rate bureau restrictions, it will become easier to observe and identify. Such competition in major geographic markets may well be the grounds for additions to the deregulated sector.

SUMMARY

The following statements summarize the contents of this chapter:

-- A comprehensive review of the experience with the current market dominance standards and procedures was conducted as part of this study. Relatively few rate filings have generated protests alleging market dominance. Even fewer have been litigated to conclusion. Reasons for the limited use of this provision are traced to shipper and carrier misunderstanding of the presumptive tests, the cost of developing data, and limited carrier use of selective rate increases.

-- Neither carriers nor shippers are fully satisfied with the current standards and procedures. Both sides feel that the revenue/Rail Form A cost data is too costly to develop. Railroads are dissatisfied with the substantial investment test. Both sides tend to agree that the 70% market share test may reflect actual market power; however, the rail carriers are concerned about definitions of market used by the Commission.

-- Six objectives for the design of new market dominance standards and procedures were identified:

1. Easily understood approaches and evidentiary requirements.

2. Ready availability of all required data.

3. Minimum cost for data preparation.

4. Emphasis on competitive forces to control maximum rates.

5. Adequate provision for shipper protection if market forces are inadequate to provide that protection.

6. Commission involvement minimized, consistent with the public interest.

-- There are three basic strategies for identifying and segmenting competitive from non-competitive traffic: prior segmentation, rebuttable presumptions, and threshold tests. Of these prior segmentation is useful primarily for identification of motor carrier competitive traffic. Rebuttable presumption tests tend to be inaccurate and distribute the burdens and benefits of regulation inequitably. Threshold tests have only limited applicability (except for maximum rate ceilings) because of data problems.

-- There are numerous forms of ratemaking flexibility which can be applied effectively to various traffic segments including complete rate deregulation, three to five year tariff plans, zone-of-reasonableness regulation, and contract rates.

-- The complexity of rail transportation markets, the potentially conflicting regulatory objectives (including both shipper protection and adequate carrier revenue), and the very different needs and planning requirements of shippers and carriers provide a powerful argument that simplistic approaches to regulatory design will be ineffective or counterproductive.

-- Several alternative procedural designs were examined, ranging from the simplest rebuttable presumption approach to a sophisticated programmatic approach. The comprehensive programmatic approach had the greatest potential of broadly satisfying all regulatory objectives. The programmatic approach considered was a logical grouping

of procedural tools tailored to the specific needs of the transportation markets as identified in this study. It places market dominance in its proper perspective as one element in the fabric regulatory reform.

-- An example of the programmatic approach would employ prior segmentation to deregulate the motor carrier competitive and non-market dominant traffic. A zone of reasonableness would allow ratemaking flexibility on the balance of the traffic while providing stability and predictability for shippers. The upper bound of the zone of reasonableness would become one threshold test for presumed market dominance. Rates higher than the threshold would become effective upon a finding of effective competition or of properly addressed revenue needs. Shippers would be protected by phasing in major rates increases over a period of from three to five years on market dominant traffic. Contract rates would be presumed non-market dominant.

-- A well designed program for regulatory reform including a properly integrated market dominance procedure can have immediate benefits in terms of regulatory objectives and be dynamic and therefore adjust to the changing needs of the market. Under such a program between 25% and 35% of the traffic would be deregulated immediately, with detailed regulatory involvement reserved for 10% - 15% of the traffic or less. In time more traffic would be expected to be defined as competitive as intramodal competition is encouraged, contract rates become widespread, and special regulatory tools are developed to further refine the Commission's classifications.

IX - SUMMARY AND RECOMMENDATIONS

This study has been conducted by A. T. Kearney, Inc. to assist the Commission in refining its approach to market dominance and to provide research results to support the Commission's deliberations and decisions in implementing its responsibilities under the 4-R Act. This is the second Interim Report developed under this contract research program. The first report focused on the development of an analytical framework for the research; the derivation of alternative concepts for analyzing market dominance; definition of preliminary alternative approaches to be analyzed; and establishment of an initial research design for the empirical analysis. This report covers the results of the empirical research and analysis and examines alternative approaches for implementing market dominance provisions and related regulatory initiatives in view of these results.

SUMMARY

(a) Study Framework

The first three chapters introduced the study and its objectives and developed the study framework. This provides a necessary backdrop to the empirical analysis and is a refined statement of results from the first Interim Report.

In Chapter I, the background of the study was reviewed, the study objectives defined, and key elements of guidance provided by the Commission presented. The essence of the guidance was the policy directions in which the Commission intends to move in further implementing the 4-R Act. In summary, these included additional reliance on competition, ratemaking freedom, and carrier-initiated decisions to achieve the goals of the 4-R Act. The study also assumes a refined, more integrated rail regulatory program will be pursued by the Commission. These are a critical set of assumptions underlying the results and conclusions.

Market dominance represents only one element of an evolving public policy approach to economic regulation of the nation's railroads. Chapter II develops the context of market dominance in terms of the policies involved in rail rate and service regulation. The primary conclusion is that market dominance must be considered as inextricably linked with the over-all regulatory program -- its rules and procedures cannot appropriately be considered in isolation.

The theoretical basis for studying market dominance issues was discussed in Chapter III. The legal definition of market dominance is related to the concept of market power and potential shipper abuse. The relationships of efficient resource allocation, discrimination, and fairness and equity issues to concepts of market dominance were explored. In addition, the functions of competitive forces in the marketplace relative to market dominant issues were examined. The analysis showed that market dominance is not a simple concept and that its overall regulatory implications must be carefully considered if its implementation is to contribute to the achievement of other 4-R Act objectives.

(b) Empirical Research and Analysis

Chapters IV, V, and VI present the research design and results of the statistical analysis and market research performed in the study. A substantial body of data and information was gathered and analyzed. The research attempted to measure difficult concepts employing new methodologies. As might be anticipated, the execution resulted in varied success. However, the process and results provide valuable information and insight which support the conclusions drawn from the study.

The research design for the empirical analysis was developed in Chapter IV. It reflected two phases - a comprehensive statistical analysis utilizing transportation data bases and a market research survey of selected major rail shipping industries. Generally the research analyzed three generic concepts for developing alternative market dominance procedures - prior segmentation, rebuttable presumptions (combination tests), and threshold tests.

The research logic assumes that if one form of effective competition is clearly present it is sufficient for competition to be relied upon for shipper protection. The measures of competitiveness were defined by economic principles and included:

Transportation Rate Differential Test
Rate/Service Differential Test
Market Share Trend Test
Intramodal Competition Test
Demand Stability Test
Rate/Service Differential Test/
  Intramodal Competition Test

Rate Differential Test/Intramodal
Competition Test
Revenue to Variable Cost Ratio Test

Each of these measures is derived from a theory that evidences market power.

The second stage of the statistical framework was a set of special purpose measures providing more information on the nature of the traffic. They were:

Demand Instability Test
Non-compensatory Rate Test
Shipper Bargaining Power Test
Average Revenue to Cost Ratio per
Railroad Test
Joint Rate Differential/Delivered
Price Increase Test

Chapter V presented a summary of the results of the statistical analysis portion of the research program. The success of individual tests varied significantly. The approach developed resulted in a cumulative "scoring" for the finding of traffic segments viewed as less competitive. The primary conclusions were that very little traffic can be clearly designated market dominant. Further, it is easier to establish the absence of market dominance by relying on one or more competitive conditions than to find the evidence of market dominance which requires a complete set of necessary and sufficient conditions.

Chapter VI presented the conclusions drawn from the market research interviews employed to review data on the logistic systems of selected industries which are major rail shippers. The results generally supported the conclusions that competitive motor carrier alternatives are available for rail transport and that many shippers have some elements of bargaining power that can be utilized in rate negotiations.

CONCLUSIONS

The conclusions drawn from the research are developed in two key chapters--Chapter VII which interprets the research results and focuses them on the central issues of the study and Chapter VIII which draws together the results and develops the conclusions for the market dominance analysis and its relation to the Commission's re-regulation program.

The interpretation of the research results can be summarized follows:

1. Rail markets are extremely complex. Any procedural design which applies general rules to rail traffic should provide for equitable treatment of exceptional cases.

2. Intermodal competition from motor carriers and barge operators affects a large share of rail traffic. Depending upon the assumptions employed, it is estimated that from 30% to 50% of all rail traffic is motor carrier competitive. This competitive traffic is primarily very short haul movements of bulk commodities (50 to 200 miles) and short to medium haul movements of manufactured goods (up to 500-700 miles or more).

3. Intramodal competition is potentially quite significant; however, its present role in protecting shippers is limited currently by the ability to set rail rates collectively.

4. Vestiges of the old value of service based rate structure result in higher revenue/cost ratios on competitive than on non-competitive traffic. This negates the value of the revenue/cost level as a test for market dominance.

5. The precise extent of market dominant traffic is difficult to determine. If all forms of transportation alternatives are considered together with long term adjustments by shippers, very little (under 5%) of the traffic would be considered market dominant. However, short term effects and the limited effectiveness of intramodal competition indicate that 10% to 15% of the rail traffic appears to be market dominant.

6. Prior segmentation may be a useful tool for implementing the market dominance provisions. However, its best application might be as a guideline for deregulating the component of rail traffic which is competitive with motor carriage.

7. None of the frequently discussed threshold tests that might be used in a market dominance procedure are fully satisfactory. A market share trend test, revenue/cost ratio test and maximum rate increase test may be useful under some limited circumstances.

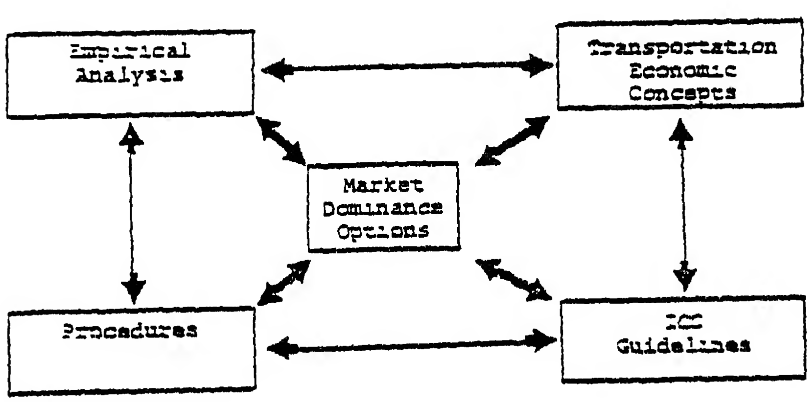
8. While adequate revenue for the rail carriers cannot be assured by direct Commission action, the Commision has an obligation to permit adequate profit levels on market dominant traffic and to encourage the elimination of non-compensatory rates.

9. Carriers and shippers will both require an adjustment process to adapt to an environment of greater ratemaking freedom.

10. Recognition of shipper bargaining power should be built into procedural design. This may be achieved by defining contract rates as presumptively non-market dominant and by permitting carriers to present indicia of shipper bargaining power as additional evidence of shipper alternatives.

11. Expanded ratemaking freedom cannot be fully achieved even with a liberal definition of the market dominance provision unless there is explicit legislative treatment of the role of state regulatory commissions.

Chapter VIII presents the study conclusions from integrating the elements of the study as discussed in the research design and depicted below:



These conclusions include:

1. A comprehensive review of the experience with the current market dominance standards and procedures was conducted as part of this study. Relatively few rate filings have generated protests alleging market dominance. Even fewer have been litigated to conclusion. Reasons for the limited use of this provision are traced to shipper and carrier misunderstanding of the presumptive tests, the cost of developing data, and limited carrier use of selective rate increases.

2. Neither carriers nor shippers are fully satisfied with the current standards and procedures. Both sides feel that the revenue/Rail Form A cost ratio is too costly to develop. Railroads are dissatisfied with the substantial investment test. Both sides tend to agree that the 70% market share test may reflect actual market power; however, the rail carriers are concerned about definitions of market used by the Commission.

3. Six objectives for the design of new market dominance standards and procedures were identified:

- Easily understood approaches and evidentiary requirements.
- Ready availability of all required data.
- Minimum cost for data preparation.
- Emphasis on competitive forces to control maximum rates.
- Adequate provision for shipper protection if market forces are inadequate to provide that protection.
- Commission involvement minimized, consistent with the public interest.

4. There are three basic strategies for identifying and segmenting competitive from non-competitive traffic: prior segmentation, rebuttable presumptions, and threshold tests. Of these prior segmentation is useful primarily for identification of motor carrier competitive traffic. Rebuttable presumption tests tend to be inaccurate and distribute the burdens and benefits of regulation inequitably. Threshold tests have only limited applicability (except for maximum rate ceilings) because of data problems.

5. There are numerous forms of ratemaking flexibility which can be applied effectively to various traffic segments including complete rate deregulation, three to five year tariff plans, zone-of-reasonableness regulation, and contract rates.

6. The complexity of rail transportation markets, the potentially conflicting regulatory objectives (including both shipper protection and adequate carrier revenue), and the very different needs and planning requirements of shippers and carriers provide a powerful argument that simplistic approaches to regulatory design will be ineffective or counterproductive.

7. Several alternative procedural designs were examined, ranging from the simplest rebuttable presumption approach to a sophisticated programmatic approach. The comprehensive programmatic approach had the greatest potential of broadly satisfying all regulatory objectives. The programmatic approach considered is a logical grouping of procedural tools tailored to the specific needs of the transportation markets as identified in this study. It places market dominance in its proper perspective as one element in the fabric of regulatory reform.

8. One example of the programmatic approach would employ prior segmentation to deregulation of the motor carrier competitive non-market dominant traffic. A zone of reasonableness would allow ratemaking flexibility on the balance of the traffic while providing stability and predictability for shippers. The upper bound of the zone of reasonableness would become one threshold test for presumed market dominance. Rates higher than the threshold would become effective upon a finding of effective competition or of properly addressed adequate revenue needs. Shippers would be protected by phasing in major rate increases over a period of from three to five years on market dominant traffic. Contract rates would be presumed non-market dominant.

9. A well designed program for regulatory reform including a properly integrated market dominance procedure can have immediate benefits in terms of regulatory objectives and be dynamic and therefore adjust to the changing needs of the market. Under such a program between 25% and 35% of the traffic would be deregulated immediately, with detailed regulatory involvement reserved for 10% - 15% of the traffic or less. In time more traffic would be expected to be defined as competitive as intramodal competition is encouraged, contract rates become widespread, and special regulatory tools are developed to further refine the Commission's classifications.

RECOMMENDATIONS

Two key points emerge from the study results which the Commission should consider carefully in implementing its responsibilities under the 4-R Act:

1. It should be recognized that market dominance is not a simple, straight-forward issue conceptually, empirically, or procedurally. It is a complex concept, difficult to identify and measure, and easily developed into burdensome procedures potentially counter-productive to 4-R Act intent and goals. The "search" for market dominant or non-market dominant traffic is likely to result in a large amount of traffic being indeterminant in the short run.

2. Market dominance should be treated as only one element in an integrated approach to achieving the new regulatory initiatives required by the 4-R Act and the economic realities of the railroad industry. To develop an effective regulatory program incorporating additional reliance on competition, ratemaking freedom, and carrier-initiated decisions to achieve 4-R Act goals, the Commission should focus on the interaction of deregulation, contract rates, peak and seasonal rates, common carriage obligation, discrimination, unstable demand, adequate revenues and market dominance in a comprehensive interactive manner in formulating its new regulatory program.

APPENDIX A

APPENDIX A

MOTOR CARRIER COSTING PROCESS

INTRODUCTION

In an effort to measure the truck competitiveness of rail traffic a motor carrier costing procedure was applied to the One Percent Railroad Waybill Sample for 1977. Each waybill record was costed as if the movement had been made by truck under several assumptions of differing types of truck service and different operational characteristics. A new waybill tape file was created which contained most of the original waybill data (including individual carrier Rail Form A cost) plus truck cost data for every record. A high and low range of truck cost/rate estimates was developed for each service type. Costs were adjusted to a mid-1977 level.

This document presents the methodology employed in developing the motor carrier costs. The discussion is in three parts:

1. Railcar to truckload conversion.

2. Truckload costing analysis.

3. Sample costs.

Each of these topics is presented in a major section below.

RAILCAR TO TRUCKLOAD CONVERSION

One of the most critical elements of the costing process was the calculation of the number of truckloads equivalent to one rail carload. This conversion process is complicated by the wide variety of railcars, the diverse trailer types available, and dimensional and weight capacity characteristics which are not directly comparable between modes. To deal with this simplifying assumption had to be made. In some instances a high and a low range estimate was employed. Key assumptions are processed below:

1. The effective constraint on trailer payload was assumed to be the 73,280 lb. standard national gross vehicle weight limit, rather than individual axle limits as the high cost range assumption. Given a 20,000 lb. tractor, the gross trailer weight was limited to 53,280 lbs. The low cost range assumption was the 80,000 lb. gross vehicle which is allowed in all but 16 states.

2. it was assumed that all movements were repetitive and that full truckloads would be shipped on a more frequent schedule than rail. This permitted the use of fractional truckloads in computing the equivalence for a given freight carload (e.g., 3.35 truckloads per carload was allowed rather than rounding up to 4.0).

3. If a freight car was loaded to less than 90% of its weight capacity, it was assumed that its cubic capacity was filled and that sufficient trailers would have to be provided for a least the equivalent cubic capacity of the freight car.

The actual conversion process was performed in two stages. First, the type of trailer was determined. Second, a conversion was made on the basis of weight or cubic capacity or both. Eight types of trailers were considered. These eight are listed in Table 1 together with the typical weight ahd cubic capacity estimates for each under low and high range assumptions.

Table 1

Trailer Types with Capacities

Type Designation	Description	High Cost Range: Weight Capacity (lbs.)	High Cost Range: Cubic Capacity (cubic feet)	Low Cost Range: Weight Capacity (lbs.)	Low Cost Range: Cubic Capacity (cubic feet)
1	Dry Van	40,700	2,800	47,420	3,150
2	Refrigerator	39,200	2,600	45,920	2,925
3	Bulk Carrier (grain, etc.)	39,700	1,500	46,420	1,800*
4	Flat Bed	45,200	N.A.	51,920	N.A.
5	Tanker	31,200	936	37,920	936
6	Auto Transporter	40,200	N.A.	46,920	N.A.
7	Livestock Carrier	40,200	N.A.	46,920	N.A.
8	Rear Dump (coal, etc.)	38,200	1,130	49,920	1,130

Source: Interviews and data from major trailer manufacturers.

*Capacity shown is for 45 foot hopper trailer which is currently in limited use due to state highway weight restrictions.

A determination was made for the proper trailer type for each movement by examining the ICC car type (costing type) and the commodity. The conversion rules are summarized in Table 2, on the following page.

The computation of the number of trailers required to transport one carload was fairly complex. Three general conditions were confronted. First, and most common, was where the trailer type required had both a weight and cubic capacity. Second, some trailers have only a weight capacity. Finally, in some instances there was a predetermined conversion constant. Prior to the conversion, however, the cubic and weight capacity for the car type involved had to be determined.

This determination was made by reference to a table of AAR car type codes and typical weight and capacity limits obtained from the Official Equipment Register. In general this table covered boxcars, flatcars, stock cars, gondolas, all hoppers, refrigerator cars, and miscellaneous special cars. Exhibit I contains a complete listing of the AAR codes and corresponding weight and cubic capacities. For tank cars capacity was determined by reference to the fourth digit of the AAR code as shown in Table 3. For AAR type "V", auto transport flats, the weight capacity was set at 65 tons.

The conversion process for each condition described above is explained in the following paragraphs.

(a) Trailer Type With Both Weight and Cubic Capacity Limits

In this case a conversion to the number of trailers was made both on a weight basis and on a cubic capacity basis. The greater number of trailers from these two calculations was taken as the value for costing purposes. The weight conversion was straightforward; the weight of the shipment was divided by the weight capacity of the trailer. (Trailer number set to 1 if the value was less than 1.) Cubic capacity presented a more complex problem. Railcars are not always full to their cubic capacity, either because of the high density of the product or because of its configuration.

Table 2

Railcar to Trailer Type Conversion

ICC Car Type	Car Description	Trailer Type Designation (See Table 1)	Commodity Exceptions
1	Box, General, Unequipped	1	SPC Codes 99,100,101,103 104,105,106,118, and 119 take trailer type 4
2	Box, General, Equipped	1	
3	Box, Special	1	
4	Gondola, General	8	SPC Codes 2,3,4,5,6, and 7 (grains) take trailer type 3
5	Gondola, Special	8	
6	Hopper, Open, General	8	
7	Hopper, Open, Special	8	
8	Hopper, Covered	3	
9	Stock	7	
10	Flat, General	4	Except SPC 114 which takes type
11,12,13,14,	Refrigerator	2	
15,16	Tank	5	
17	TOFC/COFC		Not costed

Table 3

Tankcar Weight and Volume Capacities

Forth Digit of AAR Code	Weight Capacity (Tons)	Cubic Capacity (cubic feet)
0	75	-
1	55	930
2	55	1,200
3	55	1,500
4	75	2,400
5	75	2,800
6	75	3,200
7	100	3,600
8	100	4,200
98	100	4,600

Source: The Official Railway Equipment Register.

To deal with this condition a simplifying assumption had to be made. It was assumed that if the car was loaded to less than 90% of its weight capacity, then the cubic capacity of the car was fully utilized. It was further assumed that if the car was loaded to 90% or more of its weight capacity, it may have empty space within it and the cubic volume of the goods would have to be determined by reference to a table of density values. As a consequence of these assumptions, when loading was 90% or less of the car's weight capacity, the cubic capacity conversion was made by dividing the car's cubic capacity by the trailer's cubic capacity. Conversely, when the car was loaded to more than 90% of its weight capacity, the cubic capacity conversion was made by first determining an estimated cubic volume of the load from a density value based on SPC code, and then by dividing that volume by the cubic volume of the trailer. Exhibit 2 gives the density values employed for each SPC code. These values were estimated based on ICC average densities developed for various commodities in rate proceedings. A comparison between these densities and estimates from other sources (such as the 5 digit STCC estimates prepared by MIT) indicates they are within the responsible range for aggregate analysis of the results by SPC. It should be recognized that density estimates are highly dependent on packaging procedures and product configuration. All single point density estimates even for bulk commodities have considerable error inherent in them.

(b) Trailer Type With Weight Capacity Only

In this case conversion was made directly by dividing the waybill record weight by the weight capacity of the trailer type. This procedure carries the implied assumption that the rail shipment is infinitely divisible into truckload quantities. While this is not strictly true, many products (particularly manufactured items) could be (and usually are) broken down into components which take full advantage of motor carrier weight capacities when the traffic is diverted from truck to rail.

(c) Fixed Conversion

Auto transport was accommodated by specifying a fixed conversion of 3.2 trailers per auto rack car.

TRUCKLOAD COSTING ANALYSIS

For each waybill record high and low cost/rate estimates were computed for shipping one carload by motor carrier under eight different types of motor carrier service. The eight types are listed below:

1. Common carrier, union driver.
2. Common carrier, non-unioin driver.
3. Exempt carrier, company driver.
4. Contract carrier, company driver.
5. Private fleet, union.
6. Private fleet, non-union.
7. Owner - operator (agricultural products service).
8. 40-foot double trailers, contract carrier or common carrier (currently limited to certain toll roads).

The methodology employed for determining the costs per carload for each type of service is described in the following paragraphs.

(a) Truck Cost Formula

A generalized motor carrier costing formula was developed for truckload traffic. The formula is presented below, followed by paragraphs detailing how each value was determined and presenting the actual values used.

Figure 1

Truck Costing Formula

Equivalent Truck

Cost Per Carload = NF BD(A + L + V + T) + P + O

Given:

N = Number of trailers equivalent to one carload
F = Profit factor
B = Empty backhaul factor
D = Highway distance in miles
A = Allocated fixed costs per trailer mile
L = Labor costs per vehicle mile
V = Variable line haul costs per vehicle mile
T = Trailer ownership costs per mile
P = Pickup and delivery costs per truckload
O = Overhead costs per truckload

The trailer conversion value "N" was determined as described in the preceding section. Each of the others is explained below.

(a) Profit Factor

The profit factors is a multiplier designed to recognize the fact that rates for certain types of motor carrier service are often somewhat above the minimum cost level. Table 4 lists the profit factors used for each of the eight service types. The low cost range recognizes the fact that the minimal barriers to entry into truckload markets result in little or no monopoly rent being collected by many carriers in this business.

Table 4

Profit Factors

Service Type Code	High Cost Range Profit Factor	Low Cost Range Profit Factor
1	1.03	1.00
2	1.03	1.00
3	1.05	1.00
4	1.05	1.00
5	1.00	1.00
6	1.00	1.00
7	1.00	1.00
8	1.05	1.00

Source: A. T. Kearney analysis of typical motor carrier operating statements.

(b) Empty Backhaul and Distance

Two approaches were employed for backhaul estimation, one for the high and one for the low range cost estimate. The high range cost estimate backhaul factor recognized the somewhat higher empty backhaul miles found in intrastate movements. It also reflects the fact that motor carriers today often do not compete against railroads unless sufficient backhauls are available. Conversion of rail to truck movement might require the new motor carrier entrant to haul the freight with no backhaul loads available - particularly for bulk commodities. The low range cost backhaul estimates carry an implied assumption that current observed backhaul ratios could be maintained even with substantial traffic diversion. Backhaul estimates were then converted to a multiplier for the cost calculation (e.g., for 40% empty backhaul, the multiplier was 1.667; for 0% empty backhaul, the multiplier was 1.0, etc.) Tables 5 and 6 present the values used for each combination of trailer type and motor carrier service type.

Table 5

High Cost Range
Empty Backhaul Factors - Interstate

Trailer Type	Backhaul Factors for Service Types Given 1	2	3	4	5	6	7	8
1	1.11	1.11	1.35	1.35	1.33	1.33	1.21	1.35
2	1.10	1.10	1.14	1.14	1.26	1.26	1.12	1.14
3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4	1.26	1.26	1.23	1.23	1.30	1.30	1.19	1.23
5	1.69	1.69	1.25	1.25	1.60	1.60	1.85	1.25
6	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
7	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
8	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

Source: ICC data and A. T. Kearney estimates.

Table 6

High Cost Range
Empty Backhaul Factors - Intrastate

Trailer Type	Backhaul Factors for Service Types Given							
	1	2	3	4	5	6	7	8
1	1.35	1.35	1.43	1.43	1.54	1.54	1.21	1.43
2	2.0	2.0	1.32	1.32	1.53	1.53	1.12	1.32
3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
4	1.26	1.26	1.23	1.23	1.30	1.30	1.19	1.23
5	1.69	1.69	1.25	1.25	1.60	1.60	1.85	1.25
6	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
7	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
8	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

Source: ICC data and A. T. Kearney estimates.

Table 7

Low Cost Range
Empty Backhaul Factors - All Traffic

Trailer Type	Backhaul Factors for Service Types Given							
	1	2	3	4	5	6	7	8
1	1.075	1.075	1.35	1.163	1.25	1.25	1.211	1.163
2	1.10	1.10	1.143	1.143	1.190	1.190	1.143	1.143
3	1.220	1.220	1.515	1.282	1.470	1.470	1.515	1.282
4	1.190	1.190	1.227	1.227	1.302	1.302	1.189	1.227
5	1.69	1.69	1.252	1.252	1.600	1.600	1.252	1.252
6	1.220	1.220	1.515	1.282	1.470	1.470	1.515	1.282
7	1.220	1.220	1.515	1.282	1.470	1.470	1.515	1.282
8	1.220	1.220	1.515	1.282	1.470	1.470	1.515	1.282

Source: ICC data, A. T. Kearney estimates, and AAR field survey.

Conversion of rail miles to highway miles was based on a factor of 0.9758.(1) To allow for rail route circuitry short-line rail miles were multiplied by this factor to calculate highway miles.

(c) Allocated Fixed Costs

Allocated fixed costs include tractor ownership, insurance, taxes, and other costs which are not distance related. These costs were based on engineered estimates and actual cost data for 1977. Values used for costing are given in Table 8. Values shown were multiplie times 1.82 whenever highway miles were less than 150 to allow for reduced equipment utilization in short haul service.

(d) Labor Costs

Costs for driver labor were determined based on actual 1977 union wages plus fringes and typical wage rates paid by major non-union firms. Owner-operator labor costs were estimated based on wages possible in alternative employment and include certain other personal expenses such as meals and lodging.

To recognize the higher labor cost per mile in short haul service (as a result of minimum pay provisions and lower average driving speeds) a multiplier based on highway miles was applied to the labor cost before computing total movement costs. The values are presented in Tables 9 and 10.

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(1) Bureau of the census, U.S. Department of Commerce, COMMODITY TRANSPORTATION SURVEY VOLUME II Part I, (Washington, D.C.: U.S. Printing Office, 1974), P VIII.

Table 8

Allocated Fixed Costs

Service Type	Cost Per Vehicle Mile ($)
1	$0.1356
2	.1356
3	.1130
4	.1130
5	.1356
6	.1356
7	.0969
8	.1609

Source: A. T. Kearney engineered cost data.

Table 9

Labor Costs

Service Type	Labor Cost Per Trailer Mile
1	$0.2879
2	.2591
3	.2591
4	.2591
5	.2879
6	.2591
7	.1903
8	.3025

Source: Trucking Management, Inc. Data and A. T. Kearney Estimates.

Table 10

Short-Haul Mileage Factors

Distance (Mileage Block)	Multiplier
0 - 49	1.91
50 - 99	1.47
100 - 149	1.22
150 -	1.00

Source: ICC Highway Form A Work tables.

Table 11

Ownership Costs - Dry Van Trailers

Service Type	Cost Per Vehicle Mile
1	$0.0192
2	.0192
3	.0160
4	.0160
5	.0192
6	.0192
7	.0137
8	.0384

Source: A. T. Kearney engineered cost data.

Table 12

Factors For Other Trailer Types

Trailer Type	Multiplier
1	1.000
2	1.156
3	1.050
4	0.544
5	1.497
6	1.497
7	1.000
8	1.156

Source: A. T. Kearney engineered cost data based on actual trailer price quotations.

(g) Pickup and Delivery Cost

Pickup and delivery costs vary over a broad range depending upon actual operating conditions. Unfortunately, little information is available on the waybill tape relevant to this important cost area. Common carriers typically have substantially higher P and D costs because the nature of their operations necessitates a terminal stop and change of tractors after pickup and before final delivery of each truckload. Similarly, when double 40' trailers are operated, a special "terminal" is used at the expressway ramp to drop and pick up the second trailer for delivery by another tractor. Other service types experience minimal costs from P and D, primarily due to dock-to-dock runs and trailer pooling arrangements which eliminate loading and unloading delays. P and D costs per trailer load (per 2 trailer loads for double trailers) are given in Table 13.

(h) Overhead Costs

Overhead costs include billing, collection, terminal clerical staff, traffic department expense, sales, safety programs, insurance on fixed facilities, and other general administrative expenses. Kearney's estimates were derived from engineered cost data and the income statements of typical motor carriers. Costs per trailer load for each service type (for two trailer loads for type 8) are given in Table 14 on the following page.

Table 13

Pickup and Delivery Costs

Service Type	High Range Cost	Low Range Cost*
1	$125.66	$125.66
2	110.86	5.29
3	5.00	0.00
4	5.00	0.00
5	5.85	5.85
6	5.29	5.29
7	3.00	0.00
8	147.86	147.86

Source: A. T. Kearney engineered cost data.

*Differences relate to changed assumption for labor work rules and time at customers' docks.

Table 14

Overhead Cost

Service Type	Cost Per Truck Load
1	$16.26
2	16.26
3	11.30
4	11.30
5	10.02
6	10.02
7	11.30*
8	32.53

Source: A. T. Kearney engineered cost data.

*Owner operator costs for brokerage fees were not included under the assumption that the lowest cost % movements would involve direct negotiation between agricultural shippers and the operator.

CAR TYPE CODES AND CAPACITIES

Item Number	AAR Car Code	Weight Capacity (Tons)	Cubic Capacity (Cubic Feet)
1	A100	55	4,800
2	A200	70	5,000
3	A300	70	6,000
4	A400	55	10,000
5	A110	55	4,600
6	A210	70	4,800
7	A310	70	5,800
8	A410	55	9,800
9	A120	55	4,800
10	A220	70	5,000
11	A320	70	6,000
12	A420	55	10,000
13	A130	55	4,000
14	A230	70	5,000
15	A330	70	6,000
16	A430	55	9,500
17	A140	55	4,600
18	A240	70	4,800
19	A340	70	5,800
20	A440	55	9,800
21	A150	55	4,800
22	A250	70	5,000
23	A350	70	6,000
24	A450	55	10,000
25	B100	50	3,000
26	B101	50	3,600
27	B102	50	3,600
28	B103	50	3,600
29	B104	50	3,600
30	B105	55	3,900
31	B106	55	3,900
32	B107	55	3,900
33	B108	55	4,000
34	B109	65	3,900
35	B200	55	4,200

CAR TYPE CODES AND CAPACITIES

Item Number	AAR Car Code	Weight Capacity (Tons)	Cubic Capacity (Cubic Feet)
36	B201	55	4,000
37	B202	55	4,000
38	B203	55	4,000
39	B204	50	4,600
40	B205	55	5,200
41	B206	55	4,800
42	B207	65	5,000
43	B208	70	4,900
44	B209	65	5,000
45	B300	55	4,800
46	B301	55	4,800
47	B302	55	4,800
48	B303	55	4,800
49	B304	55	4,800
50	B305	65	6,000
51	B306	65	5,000
52	B307	65	5,000
53	B308	65	5,000
54	B309	80	6,200
55	B110	50	3,000
56	B111	50	3,400
57	B112	50	3,400
58	B113	50	3,400
59	B114	50	3,400
60	B115	55	3,700
61	B116	55	3,700
62	B117	55	3,700
63	B118	55	3,800
64	B119	65	3,700
65	B210	55	4,000
66	B211	55	3,800
67	B212	55	3,800
68	B213	55	3,800
69	B214	50	4,400
70	B215	55	5,000

CAR TYPE CODES AND CAPACITIES

Item Number	AAR Car Code	Weight Capacity (Tons)	Cubic Capacity (Cubic Feet)
71	B216	55	4,600
72	B217	65	4,800
73	B218	70	4,700
74	B219	65	4,800
75	B310	55	4,600
76	B311	55	4,600
77	B312	55	4,600
78	B313	55	4,600
79	B314	55	4,600
80	B315	65	5,800
81	B316	65	4,800
82	B317	65	4,800
83	B318	65	4,800
84	B319	80	6,000
85	B120	50	3,000
86	B121	50	3,400
87	B122	50	3,400
88	B123	50	3,400
89	B124	50	3,400
90	B125	55	3,700
91	B126	55	3,700
92	B127	55	3,700
93	B128	55	3,800
94	B129	65	3,700
95	B220	55	4,000
96	B221	55	3,800
97	B222	55	3,800
98	B223	55	3,800
99	B224	50	4,400
100	B225	55	5,000
101	B226	55	4,600
102	B227	65	4,800
103	B228	70	4,700
104	B229	65	4,800
105	B320	55	4,600

CAR TYPE CODES AND CAPACITIES

Item Number	AAR Car Code	Weight Capacity (Tons)	Cubic Capacity (Cubic Feet)
106	B321	55	4,600
107	B322	55	4,600
108	B323	55	4,600
109	B324	55	4,600
110	B325	65	5,800
111	B326	65	4,800
112	B327	65	4,800
113	B328	65	4,800
114	B329	80	6,000
115	B130	50	3,000
116	B131	55	3,600
117	B132	55	3,600
118	B133	55	3,600
119	B134	55	3,600
120	B135	55	3,900
121	B136	55	3,900
122	B137	55	3,900
123	B138	55	4,000
124	B139	55	3,900
125	B230	55	4,200
126	B231	55	4,000
127	B232	55	4,000
128	B233	55	4,000
129	B234	55	4,600
130	B235	55	5,200
131	B236	55	4,800
132	B237	55	5,000
133	B238	55	4,900
134	B239	55	5,000
135	B330	55	4,800
136	B331	55	4,800
137	B332	55	4,800
138	B333	55	4,800
139	B334	55	4,800
140	B335	55	6,000

CAR TYPE CODES AND CAPACITIES

Item Number	AAR Car Code	Weight Capacity (Tons)	Cubic Capacity (Cubic Feet)
141	B336	55	5,000
142	B337	55	5,000
143	B338	55	5,000
144	B339	55	6,200
145	C100	55	2,700
146	C200	55	2,700
147	C300	65	2,700
148	C110	70	2,600
149	C210	70	2,700
150	C310	80	3,500
151	C120	55	4,000
152	C220	55	4,900
153	C320	65	5,500
154	C130	55	3,000
155	C230	55	3,000
156	C330	65	3,500
157	E100	50	3,800
158	E200	70	4,500
159	E300	95	6,810
160	E400	95	6,100
161	E110	70	2,000
162	E210	70	3,000
163	E310	75	4,000
164	E410	80	5,000
165	E120	70	2,000
166	E220	70	1,700
167	E320	90	2,500
168	E420	90	3,000
169	E130	70	1,800
170	E230	70	1,400
171	E330	70	1,900
172	E430	75	3,000
173	E140	70	2,000
174	E240	100	N/A
175	E340	90	2,500

CAR TYPE CODES AND CAPACITIES

Item Number	AAR Car Code	Weight Capacity (Tons)	Cubic Capacity (Cubic Feet)
176	E440	85	3,900
177	E150	70	2,000
178	E250	70	3,000
179	E350	70	4,000
180	E450	80	5,000
181	E160	80	1,500
182	E260	70	4,700
183	E360	70	5,000
184	E460	80	6,000
185	E170	70	2,000
186	E270	70	3,000
187	E370	70	4,000
188	E470	80	5,000
189	E180	70	2,000
190	E280	70	3,000
191	E380	70	4,000
192	E480	80	5,000
193	E190	70	2,000
194	E290	70	3,000
195	E390	70	4,000
196	E490	80	5,000
197	H120	70	2,600
198	H220	90	2,600
199	H320	100	3,700
200	H130	70	2,600
201	H230	95	3,300
202	H330	100	3,700
203	H140	65	2,300
204	H240	90	2,600
205	H340	100	3,400
206	H150	70	2,600
207	H250	75	2,600
208	H350	100	3,400
209	H160	70	2,600
210	H260	90	2,600

CAR TYPE CODES AND CAPACITIES

Item Number	AAR Car Code	Weight Capacity (Tons)	Cubic Capacity (Cubic Feet)
211	H360	100	3,800
212	H170	70	2,600
213	H270	90	2,600
214	H370	100	3,800
215	J100	70	1,500
216	J200	77	1,200
217	J300	100	1,500
218	J110	60	900
219	J210	77	1,100
220	J310	100	1,500
221	K100	55	2,100
222	K200	75	2,600
223	K300	100	3,500
224	K110	55	2,000
225	K210	77	2,600
226	K310	100	3,500
227	K120	55	3,600
228	K220	77	2,000
229	K320	100	3,000
230	K130	55	2,600
231	K230	77	2,900
232	K330	100	3,400
233	K140	70	5,000
234	K240	80	6,000
235	K340	100	7,000
236	K150	55	2,000
237	K250	75	2,600
238	K350	100	3,500
239	K160	55	2,000
240	K260	75	2,600
241	K360	100	3,500
242	K170	55	2,000
243	K270	75	2,600
244	K370	100	3,500
245	L006	50	N/A

CAR TYPE CODES AND CAPACITIES

Item Number	AAR Car Code	Weight Capacity (Tons)	Cubic Capacity (Cubic Feet)
246	L007	70	N/A
247	L008	70	N/A
248	L016	77	1,800
249	L017	77	1,700
250	L018	90	3,000
251	L026	55	N/A
252	L027	80	N/A
253	L028	100	N/A
254	L036	55	N/A
255	L037	70	N/A
256	L038	100	N/A
257	L046	55	3,000
258	L047	70	4,400
259	L048	72	6,300
260	L151	70	2,000
261	L152	100	3,600
262	L153	100	4,500
263	L154	100	5,300
264	L251	100	2,800
265	L252	70	3,500
266	L253	100	4,600
267	L254	100	5,700
268	L351	77	2,500
269	L352	100	3,600
270	L353	70	4,000
271	L354	125	5,900
272	L451	75	2,000
273	L452	77	3,700
274	L453	100	4,600
275	L454	100	5,300
276	L551	77	2,600
277	L552	77	3,500
278	L553	100	4,600
279	L554	100	5,300
280	L651	80	3,000

CAR TYPE CODES AND CAPACITIES

Item Number	AAR Car Code	Weight Capacity (Tons)	Cubic Capacity (Cubic Feet)
281	L652	100	3,900
282	L653	100	4,000
283	L654	95	5,500
284	L751	70	2,000
285	L752	100	3,500
286	L753	100	4,600
287	L754	100	7,300
288	L161	70	2,000
289	L162	100	3,600
290	L163	100	4,500
291	L164	100	5,300
292	L261	100	2,800
293	L262	70	3,500
294	L263	100	4,600
295	L264	100	5,700
296	L361	77	2,500
297	L362	100	3,600
298	L363	70	4,000
299	L364	125	5,900
300	L461	75	2,000
301	L462	77	3,700
302	L463	100	4,600
303	L464	100	5,300
304	L561	77	2,600
305	L562	77	3,500
306	L563	100	4,600
307	L564	100	5,300
308	L661	80	3,000
309	L662	100	3,900
310	L663	100	4,000
311	L664	95	5,500
312	L761	70	2,000
313	L762	100	3,500
314	L763	100	4,600
315	L764	100	7,300

CAR TYPE CODES AND CAPACITIES

Item Number	AAR Car Code	Weight Capacity (Tons)	Cubic Capacity (Cubic Feet)
316	L070	55	4,900
317	L080	46	1,000
318	L090	500	N/A
319	L052	100	4,200
320	L050	100	2,600
321	L051	55	3,500
322	L071	100	4,700
323	L200	77	N/A
324	S020	44	N/A
325	S021	50	N/A
326	S022	50	N/A
327	S060	50	N/A
328	S070	50	N/A
329	G101	50	1,200
330	G102	50	1,000
331	G201	55	1,400
332	G202	50	1,400
333	G301	77	1,700
334	G302	77	1,700
335	G401	90	2,000
336	G402	90	2,000
337	G111	55	1,400
338	G112	50	1,900
339	G211	77	1,400
340	G212	77	1,700
341	G311	100	2,200
342	G312	95	2,400
343	G411	75	1,700
344	G412	70	1,800
345	G121	55	1,400
346	G122	77	3,800
347	G221	70	1,400
348	G222	50	1,800
349	G321	95	2,200
350	G322	70	1,900

CAR TYPE CODES AND CAPACITIES

Item Number	AAR Car Code	Weight Capacity (Tons)	Cubic Capacity (Cubic Feet)
351	G421	70	1,800
352	G422	70	1,800
353	G131	50	1,400
354	G132	50	1,900
355	G231	77	1,100
356	G232	77	1,400
357	G331	90	1,800
358	G332	90	2,000
359	G431	90	2,400
360	G432	90	3,000
361	G141	50	1,200
362	G142	50	1,200
363	G241	50	1,100
364	G242	75	1,400
365	G341	77	1,500
366	G342	77	1,800
367	G441	75	2,000
368	G442	70	1,800
369	G151	60	1,000
370	G152	77	1,700
371	G251	70	2,000
372	G252	70	2,000
373	G351	70	2,000
374	G352	70	2,000
375	G451	70	2,000
376	G452	70	2,000
377	G161	70	2,000
378	G162	55	2,000
379	G261	70	2,000
380	G262	70	2,000
381	G361	70	2,000
382	G362	70	2,000
383	G461	70	2,000
384	G462	70	2,000
385	G171	70	2,000

CAR TYPE CODES AND CAPACITIES

Item Number	AAR Car Code	Weight Capacity (Tons)	Cubic Capacity (Cubic Feet)
386	G172	70	2,000
387	G271	70	2,000
388	G272	70	2,000
389	G371	70	2,000
390	G372	70	2,000
391	G471	70	2,000
392	G472	70	2,000
393	G181	70	2,000
394	G182	55	1,900
395	G281	70	2,000
396	G282	77	2,800
397	G381	70	2,000
398	G382	70	2,000
399	G481	70	2,000
400	G482	70	2,000
401	G092	100	4,000
402	G292	100	4,400
403	G392	100	4,000
404	G492	150	6,100
405	G314	100	2,500
406	R100	50	3,000
407	R200	70	5,500
408	R101	50	3,000
409	R201	70	5,500
410	R102	50	2,500
411	R202	70	3,500
412	R103	50	2,500
413	R203	70	3,500
414	R104	60	3,000
415	R204	70	4,600
416	R105	55	2,100
417	R205	70	3,600
418	R106	50	3,000
419	R206	70	4,400
420	R107	55	3,000

CAR TYPE CODES AND CAPACITIES

Item Number	AAR Car Code	Weight Capacity (Tons)	Cubic Capacity (Cubic Feet)
421	R207	70	4,500
422	R108	50	2,500
423	R208	70	3,500
424	R109	50	2,500
425	R209	70	3,500
426	R110	50	3,500
427	R210	65	4,300
428	R111	65	3,100
429	R211	30	2,500
430	R112	65	3,400
431	R212	70	4,600
432	R113	60	1,800
433	R213	70	2,400
434	R114	44	1,800
435	R214	70	4,600
436	R115	50	3,000
437	R215	70	4,000
438	R116	50	3,000
439	R216	70	4,000
440	R117	50	3,000
441	R217	90	4,600
442	R118	60	3,500
443	R218	70	3,600
444	F101	60	N/A
445	F102	60	N/A
446	F103	60	N/A
447	F109	60	N/A
448	F201	85	N/A
449	F202	85	N/A
450	F203	85	N/A
451	F209	85	N/A
452	F301	100	N/A
453	F302	100	N/A
454	F303	100	N/A
455	F309	100	N/A

CAR TYPE CODES AND CAPACITIES

Item Number	AAR Car Code	Weight Capacity (Tons)	Cubic Capacity (Cubic Feet)
456	F401	150	N/A
457	F402	150	N/A
458	F403	150	N/A
459	F409	150	N/A
460	F501	200	N/A
461	F502	200	N/A
462	F503	200	N/A
463	F509	200	N/A
464	F111	60	N/A
465	F112	60	N/A
466	F113	60	N/A
467	F119	60	N/A
468	F211	85	N/A
469	F212	85	N/A
470	F213	85	N/A
471	F219	85	N/A
472	F311	100	N/A
473	F312	100	N/A
474	F313	100	N/A
475	F319	100	N/A
476	F411	150	N/A
477	F412	150	N/A
478	F413	150	N/A
479	F419	150	N/A
480	F511	200	N/A
481	F512	200	N/A
482	F513	200	N/A
483	F519	200	N/A
484	F120	60	N/A
485	F220	85	N/A
486	F320	100	N/A
487	F420	150	N/A
488	F520	200	N/A
489	F131	60	N/A
490	F132	60	N/A

CAR TYPE CODES AND CAPACITIES

Item Number	AAR Car Code	Weight Capacity (Tons)	Cubic Capacity (Cubic Feet)
491	F133	60	N/A
492	F139	60	N/A
493	F231	85	N/A
494	F232	85	N/A
495	F233	85	N/A
496	F239	85	N/A
497	F331	100	N/A
498	F332	100	N/A
499	F333	100	N/A
500	F339	100	N/A
501	F140	60	N/A
502	F240	85	N/A
503	F340	100	N/A
504	F440	150	N/A
505	F540	200	N/A
506	F181	60	N/A
507	F182	60	N/A
508	F183	60	N/A
509	F189	60	N/A
510	F281	85	N/A
511	F282	85	N/A
512	F283	85	N/A
513	F289	85	N/A
514	F381	100	N/A
515	F382	100	N/A
516	F383	100	N/A
517	F389	100	N/A
518	F191	60	N/A
519	F192	60	N/A
520	F193	60	N/A
521	F199	60	N/A
522	F291	85	N/A
523	F292	85	N/A
524	F293	85	N/A
525	F299	85	N/A
526	F391	100	N/A
527	F392	100	N/A

PRODUCT DENSITY ESTIMATES

SPC Code	Density (Lbs. per Cubic Foot)	SPC Code	Density (Lbs. per Cubic Foot)
1	22.5	36	50.0
2	48.0	37	17.0
3	52.0	38	21.0
4	48.0	39	34.0
5	45.0	40	35.0
6	48.2	41	35.0
7	20.0	42	59.0
8	20.0	43	40.0
9	20.0	44	20.0
10	20.0	45	25.0
11	20.0	46	30.0
12	20.0	47	38.0
13	20.0	48	38.0
14	18.0	49	38.0
15	170.0	50	32.0
16	140.0	51	38.0
17	140.0	52	38.0
18	50.0	53	45.0
19	50.0	54	48.0
20	50.0	55	5.5
21	75.0	56	38.0
22	150.0	57	45.0
23	96.3	58	25.0
24	96.3	59	38.0
25	100.0	60	35.0
26	100.0	61	9.5
27	57.0	62	6.0
28	90.0	63	10.0
29	39.0	64	6.0
30	47.0	65	4.0
31	47.0	66	40.0
32	35.0	67	80.0
33	50.0	68	100.0
34	30.0	69	93.0
35	30.0	70	60.0

PRODUCT DENSITY ESTIMATES

SPC Code	Density (Lbs. per Cubic Foot)	SPC Code	Density (Lbs. per Cubic Foot)
71	40.0	106	160.0
72	80.0	107	50.0
73	112.0	108	50.0
74	51.0	109	8.0
75	57.0	110	35.0
76	60.0	111	50.0
77	36.0	112	15.0
78	41.0	113	7.5
79	40.0	114	25.0
80	76.0	115	25.0
81	20.0	116	25.0
82	41.0	117	45.0
83	56.0	118	100.0
84	65.0	119	85.0
85	95.0	120	15.0
86	90.0	121	16.8
87	65.0	122	48.0
88	26.0	123	8.0
89	16.5	124	10.0
90	35.0	125	10.0
91	12.0	126	10.0
92	85.0	127	50.0
93	120.0		
94	125.0		
95	70.0		
96	50.0		
97	5.0		
98	450.0		
99	400.0		
100	100.0		
101	15.0		
102	75.0		
103	400.0		
104	350.0		
105	400.0		